# APPLICATION OF MANAGEMENT BY OBJECTIVES TO NAVAL COMMUNICATIONS MANAGEMENT

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# THESIS

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# ABSTRACT

This thesis is a study of the integrative management technique of Management by Objectives and its application to problems of naval communications management, career development and training that are of concern to the headquarters level of naval communications. As part of this study, a pilot Management by Objectives implementation project was conducted at the U. S. Naval Communications Station San Francisco, based in part on a computer simulation model developed for the naval communications environment. The project was designed to examine implementation problems unique to the communications environment, and to assist in developing key objectives for operational and personnel management of the Communications Department. Problems of the implementation and results obtained are discussed, including recommendations for further study to fully assess the contributions Management by Objectives can make to naval communications.

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The time and effort given by the personnel of the U. S. Naval Communications Station San Francisco in support of this study is gratefully acknowledged. We hope they gained as much from their exposure to Management by Objectives as we, as students of Communications Management, gained from our exposure to naval communications.

# I. INTRODUCTION

> It must be remembered that there is nothing more difficult to plan, more doubtful of success, nor more dangerous to manage, than the creation of a new system. For the initiator has the enmity of all who would profit by the preservation of the old institutions and merely lukewarm defenders in those who would gain by the new ones.
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> Machiavelli, THE PRINCE (1513)

The purpose of this study is to examine current management and operational problems affecting naval communications and to analyze the management by objectives technique as a means for solving these problems. The first section discusses these problems and the application of management by objectives as an analytical and problem-solving method.

## A. PROBLEMS FACING NAVAL COMMUNICATIONS

Present technology and projected future communications requirements and available resources have predicated needs for extensive automation and consolidation of a majority of naval communications facilities.[1] We feel this will necessarily require a re-evaluation of current operational and administrative goals as they apply to

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[1] This was the focus of an article in the January 1970 issue of Signal magazine, the publication of the Armed Forces Communications and Electronics Association, by RADM F. J. Fitzpatrick, USN, then Commander Naval Communications Command.

maintaining an effective and efficient naval communications system of the future.

This situation is complicated by a reduction in personnel strengths in across-the-board cuts as the Navy moves into a "leaner, trimmer" post-Vietnam posture.[2]

Additional losses in naval communications personnel strength are anticipated due to an unusually high number of civilian employees eligible for retirement simultaneously over the next few years. In an address before the Senior Line Managers Institute (of the Office of Civilian Manpower and Management), on 15 December 1971, Rear Admiral Samuel L. Gravely, Commander, Naval Communications Command, voiced his concern over this situation:

> With our career civilians, as with our officer and enlisted personnel, we are deeply concerned about the necessity for maintaining an adequate reservoir of talent to meet predictable future needs. Again, this extends to all levels of civilian effort, but it is particularly pressing in the Communications Specialist and Communications-Electronics fields at the GS-9 through GS-15 levels. For example--within the next three years, some 18 percent of the civilian Communications Specialists now working

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[2] From an address by Vice Admiral D. H. Bagley, USN, Chief of Naval Personnel, before the worldwide Civilian Personnel Officers Conference, 29 September 1972, on the topic of the future of the Navy Personnel Structure, both military and civilian. James E. Johnson, Assistant Secretary of the Navy (Manpower and Reserve Affairs) addressed this situation and supports VADM Bagley's remarks on the personnel structure of the immediate future.

> for the Naval Communications Command will be eligible for retirement. Within the next five years, the figure will rise to 42 percent. And within the next ten years it will rise to 78 percent.[3]

Maintaining an adequate reservoir for filling future manpower needs is critically dependent upon personnel development and training.

The recognition of these and additional organizational and technical problems affecting naval communications was formally presented in the report from the Chief of Naval Operations' (CNO) Industry Advisory Committee on Telecommunications (CIACT), delivered to Admiral Elmo Zumwalt, CNO, on 26 July 1972. This report followed a full year of intensive effort by the CIACT group. Briefly, this report states that in the face of proven technology and current requirements:

> ... the Navy's challenge in the telecommunications field is to:
> 1. Organize properly;
> 2. Develop and train the necessary professionals;
> 3. Develop and implement an overall plan;
> 4. Raise the annual investment to an adequate level.[4]

The CIACT report designated ten major areas of naval communications requiring improvements. The two of most concern here are improvements in (1) general organization and management and (2) career development and training.

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[3] From an address by Rear Admiral Samuel L. Gravely, "Management and the Motivation of People in the Naval Communications Command", reprinted in Civilian Manpower and Management, Spring/Summer, 1972, p. 2-3.

[4] Gravely, S. L., Jr., Rear Admiral, USN, "From the Commander," Naval Communications Bulletin, No. 123, p. 1.

## B. APPLICATION OF MANAGEMENT BY OBJECTIVES

In brief, Management by Objectives (MBO) is best described as a process:

> whereby the superior and subordinate managers of an organization jointly identify its common goals, define each individual's major area of responsibility in terms of the results expected of him, and use these measures as guides for operating the unit and assessing the contributions of each of its members.[5]

MBO centers on the motivation of the individual to do his best to help accomplish the overall objectives of the organization. It is this involvement in the act of management that elicits responsible action from people, as noted in Humble [1970]. With effective consultation and review, individual achievement is acknowledged, thus providing the motivation for continued efforts towards successful achievement and acceptance of more challenging tasks. An important part of the process is a well-defined work performance review method. Having mutually determined the performance objectives of the subordinate, the superior has available the guidelines necessary to evaluate his subordinate's accomplishments.

Although the overall goal of MBO is to achieve organization objectives by improving managerial performance, several valuable spin-offs result from the implementation and continuing process of MBO. Briefly, these provide for:

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[5] Odiorne, G. S., Management by Objectives, p. 55-56, Pitman, 1965.

1. Measuring and judging performance objectively;
2. Relating individual performance to organizational objectives;
3. Clarifying both the job to be done and the expectations of accomplishment;
4. Fostering the increasing competence and development of the subordinate;
5. Enhancing communications between superior and subordinate;
6. Serving as a basis for judgments about salary, rewards and promotion;
7. Stimulating the subordinate's motivation; and
8. Serving as a device for organizational control and integration.[6]

In many instances these products themselves have become the mainstay and focal point of MBO, in separate applications, reflecting the flexibility and far reaching effects of this management process.

It is the premise of this thesis that the MBO concept appears especially suited to provide an integrated approach to solving naval communications problems. Its procedure of critical analysis of organizational and unit objectives, problems and areas of improveme t can result in task force and individual responsibilities to secure planned results and improvements. Operational, technical and personnel communications requirements can be approached using

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[6]Although these eight items follow generally those suggested by Levinson [1970], they represent a general common thread found in much of the MBO literature [Humble, 1970; Odiorne, 1965; Reddin, 1970; and Schleh, 1961].

Key Results Analysis[7] to examine management jobs (and responsibilities) and to establish or strengthen existing operational performance standards, control information and authority relationships. These factors are integrated through the joint performance and potential reviews of the MBO process between the manager and his superior. It is this step which we feel enhances planning for managerial succession and identification of proven performers needed to fill personnel gaps. In turn this would strengthen the personnel continuity required during the rapid evolution planned for future communications developments. Joint performance and potential reviews would improve individual management development as well as provide for a specific career advancement program for the communications specialist.

We feel that an additional justification of an MBO approach to the problems discussed earlier is the recent interest by the Bureau of Naval Personnel in obtaining a more objective and useful evaluation of Naval Officers. This feeling was gained during a review of the current instruction, "Report on the Fitness of Officers", BUPERS INSTRUCTION 1611.12, issued by the Bureau of Naval Personnel on 20 March 1972. Included in this instruction are changes to the

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[7] Key Result Analysis is a specific term used by Humble [1970] to describe the process used by a manager to analyze the main purpose of his job, his position with the organization, his responsibilities, and limits of authority. This will be covered in detail in a later section.

reporting procedures designed to improve the evaluation of Naval Officers by (1) facilitating more effective communications between the reporting senior (appraisor) and the decision groups for advancement and assignment, and (2) to make the subject officer more aware of the basis upon which he is being evaluated. For example, section 4-11 d., indicated as a change to the previous instruction, states:

> In order to foster a concept of "management by objectives", reporting seniors should seek to establish with each and every subordinate mutually understood finite objectives for which the subordinate will be held accountable. Subsequent fitness reports should then contain comment upon the degree of attainment of each such objective.

Additionally, an experimental Officer "Appraisal" Form is presently being evaluated by the Center For Naval Analysis.[8] It contains specific aspects of performance evaluation by superiors dealing with itemized areas of an officer's abilities as "Goal Setting and Achievement" and "Subordinate Development and Management".

We feel, however, that decisions for advancement of personnel as part of a personnel development program require information not completely provided by the MBO process nor any existing management

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[8] A number of these experimental Officer Fitness Report Forms have been circulated for evaluation as proposed by the Center for Naval Analysis (CNA) in its memorandum 1897-72, dated 8 December 1972, "Proposed New Officer Performance Evaluation System". It must be noted that this is only a trial program and may not survive final evaluation, but it is an indication of the interest in developing a more realistic and objective evaluation.

procedure in use by the Navy. It is an additional premise of this thesis that a separate personnel assessment technique is a logical distinction from, but a necessary follow-on to, the MBO process. MBO purportedly provides the objectivity and feedback necessary to appraise and evaluate performance [Mali, 1972], but does it provide the information necessary to properly consider advancements and promotion? We agree with Odiorne [1965] that MBO:

> ... cannot appraise and completely identify potential. The system deals only with performance on the present job. Appraisal of potential must be done separately. [9]

It has been shown conclusively by Dunnette [1966] and Kelly [1967] that different types of jobs or levels within one job functional area often require different behavior or personal requirements. Thus, personnel appraisal based on past performance can lead to wrong decisions in job advancement.

Sufficient interest in improving selection techniques for staffing higher management positions from within the organization has been generated by several Navy offices. The issuance of Secretary of the Navy Notice 12412 of 26 April 1972, and Naval Material Instruction 12412.1, both pertaining to "Civilian Executive Development" within the Navy, are two examples. These references pertain to finding solutions to the same problem of gaps in the personnel ranks as outlined by Rear Admiral Gravely.

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[9] Odiorne, op. cit., p. 180.

Part of the background research for this MBO study pursued extensively the Assessment Center technique as a supplement to MBO, continuing where Odiorne feels MBO stops. The Assessment Center technique is a program for assessing job behaviors in personnel recommended for advancement that relate to those job behaviors required in the positions to which they may be advanced. The result of MBO followed by the Assessment Center is visualized as a combination of personnel management procedures which develops and objectively identifies proven performers, then critically and effectively assesses those performers for higher managerial positions requiring different job behavior requirements that may not have been necessary or visible in the previous position. Appendix A continues this argument and provides additional background on the Assessment Center technique.

## C. SCOPE OF THE STUDY

It was felt that an evaluation of MBO in relation to the factors as presented in Sections A and B above would serve as a useful study to the Navy and for ourselves as Communications Management Subspecialists.

We approached the study by conducting a thorough review of the MBO literature available. This included analyzing the concept from a naval communications environment viewpoint and in terms of its value and application in solving the problems of naval communications as we envision them.

We began to solidify the study as we worked with advisors on the faculty of the Naval Postgraduate School, Monterey, California, who were involved in a pilot MBO implementation project at the Naval Supply and Regional Finance Centers in San Diego, California. The Naval Communications Station San Francisco, located on Rough and Ready Island, Stockton, California, was selected for a pilot study as the closest site and because of its operational importance in the naval communications network.

The final form of the pilot study at the communications station was structured to accomplish three main objectives:

1. To implement an MBO system within the time frame available, examining implementation problems particular to the communications station environment.

2. To assess as accurately as possible the results of MBO as implemented and to assist with the development of key objectives for operational and personnel management of the communications station.

3. To gain an insight into naval communications functions and organization for our own professional development as Communications Management Subspecialists.

The unfortunate weakness of attempting this pilot project was that as advisors for the MBO implementation, we could only visit Stockton one day of each week because of the distance involved and the requirement to attend our regular classes. This is hardly an ideal situation, according to Humble [1970], because of the importance of insuring enthusiasm and continuity to the daily process of the MBO

routine during the sensitive stages of introduction and implementation. We have attempted to address the effects of this situation in Part V of the thesis in our evaluation of the study.

## II. REVIEW OF MANAGEMENT BY OBJECTIVES

In this section we review the concept and development of MBO as it has been applied to various organizations with similar problems as those we believe are also facing naval communications. Specific emphasis on the analysis and criticisms of the MBO process is presented to illustrate its depth and magnitude in influencing an organization's activities.

### A. MANAGEMENT BY OBJECTIVES CONCEPT

According to Mali [1972], the concept of MBO was first presented in 1954 in a chapter from Drucker's The Practice of Management, titled "The Objectives of a Business."[10] Drucker sought to show that by integrating the individual's needs with the company's there would result a more motivated and company-oriented employee. Schleh, borrowing from presentations of other management thinkers, developed a "cohesive philosophy of management" which he called "results management" and presented this philosophy in his book Management by Results [Schleh, 1961]. Schleh focused his concept on the relationship between the supervisor and employee, using the theme that all management must be looked at from a grass-roots

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[10]Drucker, P. F., The Practice of Management, p. 62-65, 126-129, Harper & Row, 1954.

approach that focuses on what must be accomplished at the bottom level of an enterprise" [Schleh, 1961]. Later, in 1964, Drucker sought to crystalize his concept of participative management by focusing on the economic - inputs versus outputs - of managing in his book Managing for Results [Drucker, 1964].

During those ten years management specialists and consultants, such as Odiorne and Humble, began systematically developing the concept of MBO and directing its application towards specific use in many business fields. MBO is currently in operation in a variety of industrial organizations. A list of representative firms is contained in Appendix B.

Presently there are many other writers and practicing managerial consultants in the MBO field. Much of their work has been influenced not only by Drucker, Odiorne and Humble, but also by the basic works of such management theorists as Likert and McGregor. Likert's "linking pin" concept which is based on the principles of supportive relationships derived from recognition of the worth of human resources and the value of participative management [Likert, 1961], and McGregor's influence to recognize the need of performance appraisal to consider the subordinate as an active agent rather than a passive object if management development

is to be meaningful [McGregor, 1957],[11] are very visible in the principles of MBO.

## B. REPRESENTATIVE MANAGEMENT BY OBJECTIVES PROCESS

Except for slight variations in team approach use, the following representative process is similar to that suggested in Humble's book Management by Objectives in Action [1970]. We have listed the actual steps of the MBO process that would follow the introduction and training phase of MBO during a typical implementation of the program into an organization.

1. Re-evaluate the organization's objectives.

To do this calls for a critical look inside the organization to assess the reasons for its existence, what it is that the organization does, what its plans are, what direction it must go to meet those plans (considering external influences) and to establish broad objectives that support this assessment. Factors which supply strength or weakness to the overall effectiveness of the organization are considered. This re-evaluation is carried out at the highest level of the organization or unit by those top managers in overall control. Examples of objectives which might result from this step:

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[11] One of the most complete and up-to-date bibliographies on MBO is contained in W. T. Reddin's book Effective Management by Objectives: the 3-D Method, McGraw-Hill, New York, 1971.

- maintain share of the market at 15 percent
- increase return on investment by 3 percent over last year's 10 percent
- meet federal environmental pollution standards by 1975
- consolidate overseas holdings to four major sites by 1976
- implement fully automated facilities at each major coastal entry point by 1974.

2. Discuss objectives at middle management level.

Once broad objectives are established, the middle managers meet with top management to discuss the objectives as they apply to the middle managers' functional areas. They insure that the objectives they develop themselves are in line with and support the broad overall objectives. The team approach is recommended at this level to insure coordination between managers and clarity of individual responsibilities as they apply to overall objectives.

These two steps may vary considerably depending on the nature of the activity and the level at which MBO is being applied. For example, in implementing MBO at the top of a large organization, it may have been determined that productivity may be adversely affected by a loss of a key overseas raw materials source. This would require a different level of assessment and direction of planning than in an MBO application aimed at the receiving and shipping department of a retailing firm suffering an abundance of customer complaints about lost, late or damaged deliveries.

3. Creating the individual manager's objectives

The manager, with the assistance of the MBO advisor, begins developing his individual objectives by using a procedure known as Key Results Analysis [Humble, 1970]. Key results analysis (KRA) is a useful way to get the manager to analyze his key tasks (which support the objectives derived in steps 3 and 4), performance standards, and control information. This analysis requires the manager to consider the main purpose of his job (what his job function is), his position in the organization, scope of his job, his personal activities, and limits of authority. This reevaluation of the manager's job through KRA is primarily done because normal job definitions are usually too long and too general, describe activities rather than results and may be obsolete, at least in part. Two forms, the Job Analysis Sheet and Key Result Areas Sheet are used by Humble as the means for documenting the results of the KRA. Together these two forms comprise the Management Guide and are the only paperwork necessary in the MBO process. There is normally only one Job Analysis Sheet and as many Key Result Area Sheets as are required to document the major responsibilities of the manager. Refer to Appendix C for a detailed description of the Management Guide.

4. Conducting the Initial Performance Review

Having completed his Management Guide, the manager meets with his supervisor to discuss the manager's objectives. This provides the opportunity for frank and open discussions of the manager's personal objectives and views in relation to those of the organization. The superior provides guidance in meshing the manager's personal and company objectives. When both agree to language and content of the management guide, the manager's performance can be assessed objectively when reviewing the guide at a later pre-set date.

5. Conducting the follow-up reviews

After the initial review, the manager and his superior meet at regular intervals to assess the manager's objectives. This provides an opportunity to change or establish new objectives, and to provide an opportunity to discuss job improvements recommended by the manager.

We believe almost every MBO program should contain these steps with variations in the introduction and implementation phase suited to the organization. Even with the different emphasis and points of view observed throughout the literature, Reddin [1971] indicates that common key elements in MBO as a system can be identified in most applications and discussions. He lists these elements as they have been interpreted and actually applied in industry:

Objectives Established for Positions: MBO is based squarely on setting objectives for managerial positions.

Use of Joint Objectives Settings: Most MBO systems employ some kind of joint objective setting. Both superior and subordinate participate in the objective-setting process.

Linking of Objectives: Some form of linking of objectives is part of all MBO systems, e.g., if marketing has an objective of selling 100,000 units, production has an objective of producing 100,000 units.

Emphasis on Measurement and Control: If an objective cannot be measured, its attainment cannot be known. If an objective cannot be subject to control, it is simply a prediction and not an objective. However, few systems go as far as to say, 'If you can't measure it, forget it'.

Establishment of a Review and Recycle System: All MBO systems have some form of review of progress toward objectives, some action is taken, and then new objectives are set for the next period. The review is always between the superior and the subordinate.

High Superior Involvement: Most MBO systems involve the superior more than the subordinate.

High Staff Support in Early Stages: Few organizations are so well designed to have managers so well trained that MBO can be put in without trained staff support. [12]

These elements represent the common thread in MBO and can be observed in most applications as indicated to us throughout the literature.

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[12] Reddin, W. J., Effective Management By Objectives: The 3-D Method of MBO, p. 13-15, McGraw-Hill, 1971.

In our study of the communications station, we felt that Humble's emphasis on taking a fresh look at the organization as a whole and examining the reasons for its existence [Humble, 1970] would provide the best approach for implementing MBO.

## C. IMPORTANCE OF OBJECTIVES

It is important to discuss objectives in more detail because they represent the focal point of the MBO process. They are not well understood and are misused by many managers and, according to Reddin [1971], even by some MBO writers. Quite often targets or goals used by managers are described with words or phrases such as "reasonable," "adequate," "minimum delay," "maximum effectiveness", "prompt," "occasional," "with only minor errors," [Reddin, 1971; Humble/BNA Films, 1970]. This kind of language does not constitute workable targets since the language does not allow measurements. An objective is a target only to the extent that it can be clearly perceived and measured. By using quantitative measurements, e.g., in the form of ratios, or other specific measurements such as quality, cost and time, only then are meaningful objectives possible.

## D. REVIEW OF SELECTED MANAGEMENT BY OBJECTIVES APPLICATIONS

The literature reveals that MBO is functioning successfully in a variety of commercial (industrial) organizations, covering such

activities as manufacturing, processing, research and development and services (Appendix B). Several examples of such applications are reviewed in this section to illustrate the wide range of applicability of MBO.

From an application in a manufacturing and merchandizing firm of tableware the following results were observed from company personnel:

> Frankly, when management by objectives was first put over, people were afraid it was a critical measurement rather than an aid. The job analysis followed by the setting of objectives got rid of the grey edges of activity. It exposed a lot of weaknesses in the managers, myself included, but also showed our strengths; mainly that it was really possible to control one's operation knowing exactly what was happening and what progress we were making on a daily basis.[13]

Looking at a different application, the results of applying MBO in a research and development activity indicated that few of the ideas or suggestions arising from the application are new. According to Humble [1970], the reason that they have not been applied before in the R & D case is that although most everyone is aware of these ideas, they are not that simple to apply, needing both time and collective willingness and concentration. Heavy pressures from the top for progress on the job results in difficulties in getting people to define precisely what the job consists of, how it is to be done and who is to

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[13]Humble, J. W., (Ed.), Management by Objectives in Action, p. 84, McGraw-Hill, 1970.

do what. The application of MBO, in this instance, introduced systematic thought and direction to the R & D activity:

> It has been found that, in practice, it does make the individual think through his job and show him opportunities for improvement, as well as providing him with a better understanding of how his tasks relate to others. It gives an individual ideas of how to help the members of his team to be more effective. Further, it provides an opportunity to try to relate performance standards to overall objectives, especially in the sense that it sharpens up the criteria of acceptance of work into an R and D department, the definition of the customer of the work, and by what standards the customer will be satisfied with the results achieved. Above all, it is important to realize that success in R and D is dependent on people -- on their intellectual capability, on their appreciation of objectives, and on their behavior as a working group. The main conclusion to be drawn is the need for a greater awareness of the importance of information and events leading to the decisions to proceed to the next stage of work rather than in the mechanistic efficiency of doing the work. [14]

By contrast, MBO has experienced practical problems in some applications due, for example, to a decline in enthusiasm and failure to use the whole program cycle. Tosi and Carroll's [1970] empirical study based on in-depth interviews with 48 managers of a large manufacturing firm illustrates this problem. The interrelationship between satisfaction with MBO and the feedback areas of the review process is shown to be statistically very high, with correlations of $r = .42$. When the complete MBO cycle was accomplished with thorough reviews, managerial satisfaction with MBO was high, but

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[14]Ibid., p. 122-123.

when the reviews were considered weak or were incomplete, satisfaction with MBO dropped significantly. There was a pressing need exhibited on the managers' part for feedback - to "know where they stood" - which had not occurred due to poor or infrequent reviews. Tosi and Carroll feel that the full benefit of MBO did not occur, which might have, had the planning and review cycle been completed.

Another interesting application of MBO is that pursued by the Pacific Telephone and Telegraph Company. In discussion with one of its personnel officers, it was learned that the application of MBO is left to the decision of the Regional Manager. The actual figure is unknown but it is estimated that a majority of these managers are using MBO at their level of the organization (middle management).

Additionally, it was learned that Pacific Telephone uses the Assessment Center technique (Appendix A) for recommending and selecting personnel to higher managerial levels in conjunction with the objective performance appraisal element of MBO.

The three MBO applications in government or military organizations that were covered in the literature discuss programs in the Royal Naval Supply and Transport Service (RNSTS) of the Ministry of Defense (British Royal Navy) [Humble, 1970], the Career Management and Planning Branch of the Office of Civilian Manpower and Management (OCMM) [Cirillo, 1968], and the Naval Supply Center,

San Diego, of the Naval Material Command (still in the implementation stage).[15]

All three of these MBO applications deal with civilian middle and top level managerial levels in non-operational activities. As applied to a supply operation, the RNSTS MBO program has been considered fairly successful from both the operational (savings and efficiency) and personnel (training, development and morale) areas [Humble, 1970]. It had been implemented on a team basis to provide a new set of unit objectives at various levels for further break down into individual manager key areas of responsibility.

The OCMM MBO program was largely confined to only a few managers at the top management level (GS-15 and up) emphasizing planning and broad program objectives [Cirillo, 1968].

The San Diego program known as project PUMP - Personnel Upward Mobility Program - involves a combination of both MBO and "Group Appraisal" techniques combined to provide a Management Development Program for the Naval Regional Finance Center and the Naval Supply Center. The program has several objectives, one of which is to strengthen the line organization in such matters as communication and efficiency through greater understanding between adjacent levels of supervision and alignment of individual

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[15]Elster, R. S., W. Githens and G. Musgrave, "Personnel Development and Evaluation System", U. S. Naval Postgraduate School, Technical Report, Forthcoming.

goals with organizational goals. Part of the theory behind PUMP is that it will motivate and develop lower level managers within the Supply Corps civilian ranks to fill the unusually large numbers of vacancies that are anticipated when a large percentage of senior civilian managers reach retirement age at approximately the same time. This is a similar problem as outlined by Rear Admiral Gravely in the introduction of this thesis.

## D. ANALYSIS AND CRITICISMS OF MANAGEMENT BY OBJECTIVES

Acceptance of MBO is not automatic. This section examines some of the reasons for the resistance and the misunderstandings which MBO systems have encountered and offers some suggestions to remedy the problems.

Excessive Paperwork. Often too much paperwork is generated in documenting the MBO process by overzealous managers to the detriment of the program acceptance at lower levels [Raia, 1969; Tosi and Carroll, 1968]. This is contrary to the procedures explained by Humble and others who assert that a minimum amount of paperwork or documentation is necessary. Representative procedures recommended by Humble and Reddin require only one document to record objectives and their associated standards and control information. Only two copies are needed between superior and subordinate and extra copies will simply fill files [Reddin, 1971].

See Appendix 3 for a detailed description of the management guide suggested by Humble and Reddin.

Difficulty in Setting Staff Objectives. Both Oberg [1972] and Gill and Molander [1970] state that it is difficult to arrive at acceptable objectives for staff members. This is because staff results often depend on the cooperation of line managers and supervisors, thus indicating the difficulty in measuring an individual's performance in areas he cannot control directly. Levinson [1970] supports this argument from the impact of social and organizational factors and states that the more a man's effectiveness depends on what other people do, the less he himself can be held responsible for the outcome of his efforts. However, MBO can provide the staff member the opportunity to visualize his function more clearly and measure his contributions to the organization [McConkey, 1972]. It just takes more effort. As McConkey illustrates, structuring staff objectives differently from line objectives in terms of number, length, time, and number of progress reviews will result in more meaningful objectives. For example, a staff member may have a greater number of objectives than a line manager because of the multiplicity of accountabilities within the staff position [McConkey, 1972]. By associating these accountabilities by project or function and identifying any relationship to specific line areas, the staff member can participate in joint line-staff discussions on objectives and know exactly where he stands.

Suboptimization. Although this is one problem MBO is designed to prevent, it reportedly occurs in MBO programs according to Levinson, Raia and others. Suboptimization refers to pursuing one goal at the expense of another of equal or greater importance. Suboptimization in an MBO process comes from an overemphasis on production or measurement of goals resulting in quality of performance losing out to quantification [Levinson, 1970; Raia, 1969; and Tosi and Carroll, 1968], and when short term goals become detrimental to long term profitability because rewards encourage individual achievement now rather than in some distant future [Gill and Molander, 1970]. These two instances occur, however, because the basic elements of MBO have been neglected. In the first case, production goals (quantity) were not tied in with quality assurance goals indicating that a thorough analysis of the entire production process had not been conducted or possibly its relation to causes for loss of sales had not been examined. In the second case, short term goals were obviously not developed from long range objectives for profitability, otherwise the long range objectives would have been met as the short term were completed. Rewards for achieving objectives (short or long term) are necessarily independent from the time element of objectives if the periodic reviews are held regularly and progress can be measured objectively at those reviews.

Lack of Inter-Manager Cooperation. It is felt by some that precise defining of objectives in the MBO process leads to stifling of cooperation in multifunctional ideas and to intergroup competition. That is to say that objectives

> ... are set on a managerial - subordinate basis with little reference to the targets which are set for other managers or those which are laid down as organizational objectives.[16]

This leaves some critics to believe that both the processes of setting objectives and the appraisal review offer little towards development of teamwork between departments which in turn lessens control of the organization [Levinson, 1970].

The problem here is mainly one of using MBO to force the organization structure and interpersonal relationships into only a one-on-one basis while ignoring the proven ability of MBO for getting individuals coordinated into a unity of action [Mali, 1972]. When functional roles or interdepartmental activity within an organization are necessarily interdependent and closely related, and we submit that this is the most common case, then it should follow that objectives must be set on a group basis [Gill and Molander, 1970; Gellerman, 1968; Levinson, 1970]. Setting objectives by relevant groups of subordinates in conjunction with their superior clarifies the

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[16]Gill, J. and Molander, C. F., "Beyond Management By Objectives," Personnel Management, July 1970, p. 18-20.

responsibility of each individual. In the same manner, the superior's own objectives could be set on the same basis [Gill and Molander, 1970]. This argument is supported by March and Simon in the development of their hypothesis on perceived goalsharing:

> 1. The greater the extent to which goals are perceived as shared among members of a group, the stronger the propensity of the individual to identify with the group.
>
> 2. The stronger the propensity of the individual to identify with the group, the less the amount of competition between the members of a group and an individual. [17]

Reddin [1971] supports the group or team approach in all MBO applications in order to gain clarity of individual responsibilities.

Quantifying Goals Stifles Individual Self-Control. Forcing subordinates to quantify goals defeats the purpose of MBO by not allowing them to exercise self-control [Ivancevich, et al, 1970] and once objectives are set, little is left for areas of discretion [Levinson, 1970]. However, while it is sometimes difficult to set precise objectives, an objective is only useful if its attainment is measurable. Conversely, if it is not measurable, it is impossible to determine whether the objective has been reached [Reddin, 1971]. Actually, this criticism misses the point of MBO completely, because according to Drucker [1954], the greatest advantage of managing by objectives

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[17] March, J. G. and Simon, H. A., Organizations, p. 66, John Wiley & Sons, 1958.

is the personal involvement of the subordinate in goal setting which actually allows him to exhibit self-control over his own performance.

Objectivity Cannot be Maintained in Rating. Gellerman, in his book Management by Motivation [1968], considers it difficult to be objective in rating an individual. Part of his argument is that objectives or goals cannot be set well enough to measure an individual's performance, a point which has been discussed in the previous paragraph. Mainly, he sees the problem as a conflict between the immediate needs of the rater's job (i.e., rating) and the long range interest of the organization because often the rater insures his own success by attempting to motivate the ratee by overrating his performance rather than measuring his work objectively [Gellerman, 1968]. Levinson supports this position, believing that objectivity is a "vain plea" because every subordinate is tied directly to his superior's efforts to achieve his own goals and thus the subordinate will be appraised on how well he supports his superior [Levinson, 1970].

Through proper implementation, MBO addresses the relationship between "rating" (the evaluation of individual performance) and "managing" through the performance appraisal phase. There should be no conflict if the supervisor has agreed, during the objectives setting phase, that what the subordinate is accountable for supports those objectives of the supervisor and the organization in an accurate and meaningful way [Mali, 1972]. As a rater, he then enjoys the opportunity to use resultant, accurate data as the basis for his

appraisal. Motivation is assured when the rater enjoys participation in and commitment to those performance requirements in which he is involved, and not when receiving an inflated rating, which he knows to be false.

Organizational versus Individual Needs. The one obvious stress point in the entire MBO process is the relationship between individual and organizational goals. Just how sensitive does the organization have to be towards the individual's needs? Levinson states that

> .... to place consideration of the managers' personal objectives first does not minimize the importance of the organization's goals. It does not mean there is anything wrong with the organization's need to increase its return on investment, its size, its productivity or its other goals.[18]

Levinson focuses the responsibility of bringing the two sides together squarely on the organization with the first step being that of understanding the individual's needs and then, with him, assuring how they can be achieved while in pursuit of the organization's needs. Much of the success attributed to a working MBO system rests on the accomplishment of aligning the needs of the individual with the organization's [Mali, 1972]. McGregor suggests that a proper role for the superior is:

> helping the subordinate relate his career planning to the needs and realities of the organization. In the discussions (on objective setting) the boss can use his knowledge of the organization to help the

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[18]Levinson, H., "Management by Whose Objectives?" Harvard Business Review, p. 125-134, July-August 1970.

> subordinate establish targets and methods for achieving them which will (a) lead to increased knowledge and skill, (b) contribute to organizational objectives, and (c) test the subordinate's appraisal of himself. This is help which the subordinate wants. He knows well that the rewards and satisfaction he seeks from his career as a manager depend on his contribution to organizational objectives. He is also aware that the superior knows more completely than he what is required for success in this organization and under this boss. The superior, then, is the person who can help him test the soundness of his goals and his plans for achieving them.[19]

Summary. The vast majority of the authors read realize some of the difficulties highlighted in this section do exist, yet feel the effort required to overcome them is well worth it to gain the advantages MBO brings to an organization.

The recent trends in industry and government towards more effective management of the human resources have led to many changes.[20] As a catalyst for change, MBO appears as a fulcrum for any turnabout of management philosophy. Blau [Litterer, 1969] comes closest in placing his finger on the central issue when he say that evaluation on the basis of standards that specify results to be

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[19]McGregor, D., An Uneasy Look at Performance Appraisal," Harvard Business Review, p. 89-94, May-June 1957.

[20]Optimizing Human Resources, Addison-Wesley Publishing Co., (1971) edited by Lippitt. This and Bidwell, is an excellent collection of readings on human resources development that highlights the change in orientation of personnel management to meet the trends in society and the needs of changing organizations.

accomplished "constrains" employees to discipline themselves and eliminates close supervision. Many of the problems discussed above occur due to a lack of understanding of the philosophy behind the MBO process. In introducing the concept of MBO Drucker emphasized this point and cautioned awareness of these problems. His concern was that MBO has far reaching effects and may produce undesirable changes through insufficient awareness of this fact. Mali states that the companies that have had successful results with the strategy of MBO overcame similar difficulties encountered above because their supervisors and managers were not only fully aware of the MBO rationale and procedure, but also willing to put forth the effort and time needed to make it work [Mali, 1972].

Any movement towards an objectives-oriented system most likely constitutes a fundamental change in managerial orientation and style which may also call for alterations within the organization [Tosi and Carroll, 1968]. Gill and Molander support this view and suggest that:

> MBO is best placed in context if regarded as one of a number of useful analytical techniques whereby the organization might take a good look at itself. Any claim that it may have to be a recipe for complete success in itself is almost certainly too optimistic a view.[21]

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[21] Gill, J., and Molander, C. F., op cit., p. 20.

## III. DEVELOPMENT OF THE IMPLEMENTATION PROCEDURE

As discussed earlier the performance objectives established by the MBO process can either focus upon individuals or groups of individuals working within the same functional unit. The purpose of this chapter is to discuss the organizational structure of a typical communications station, the determination of which approach (individual versus group) would be best, and the development of an MBO implementation plan to best suit the needs of the communications organization. Although our initial approach was directed at the basic communications station organization at the department head level using individual-oriented objectives, unforeseen factors later indicated that the group-oriented objective approach at the Communications Department level would be more productive.

### A. DESCRIPTION OF COMMUNICATIONS STATION ORGANIZATION

As an activity of the Naval Communications Command, the U. S. Naval Communications Station San Francisco's stated mission is ".... to manage, operate, and maintain those facilities, equipment, devices and systems necessary to provide requisite communications ...."[22] To fulfill this mission, the Naval Communications Station

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[22]Extracted from NAVCOMMSTA SFRAN INST. 5450.2D of 1 August 1972.

San Francisco is patterned along functional lines, with eight department heads reporting to the commanding officer via the executive officer. The eight departments are: Operations, Plans, Communications, Administration, Supply, CAMS (Communications Area Master Station), Security, and Public Works.[23]

The functional responsibilities of the five department heads to be included in this study are:

1. "Operations - coordinates operations of all general service communication elements of the command, and, as the principal communications/electronics advisor to the Commanding Officer, promulgates maintenance, operational, and training policies for the command.

2. Plans - provides research and coordination for future plans and a source of information on projects.

3. Communications - responsible, under the Commanding Officer, for the accomplishment of the assigned mission of the station.

4. Administrative - responsible, under the Comanding Officer, for the administrative matters of the station ...

5. Supply - responsible, under the Commanding Officer, for procuring, receiving, storing, issuing, transferring, accounting for, and, while in his custody, maintaining all stores of the command ..."

(A more detailed statement of these responsibilities can be found in NAVCOMMSTA SFRAN INST. 5450.2D of 1 August 1972).

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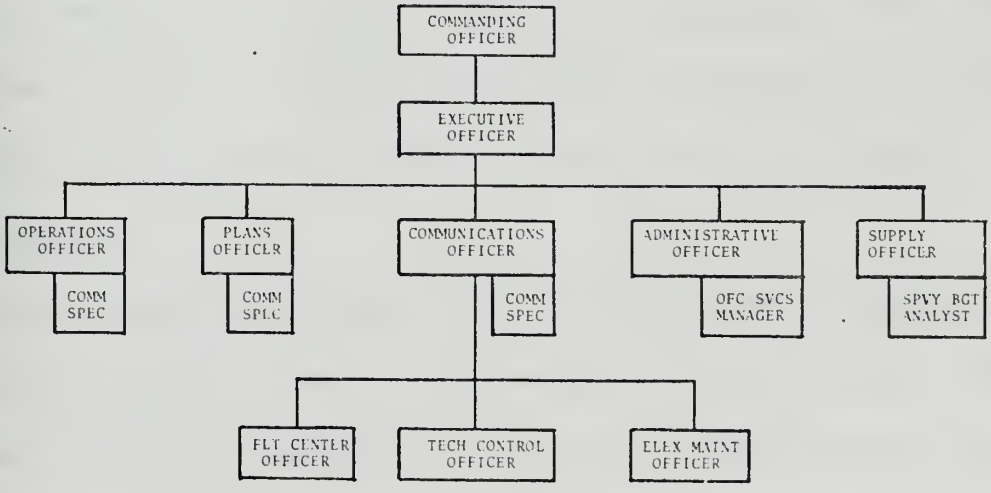
[23]Naval Communications Station San Francisco is different from the "typical" naval communications station in that the last three departments listed - CAMS, Security, and Public Works - are not usually found at other stations, and for the purposes of this study are omitted.

The rank structure consists of unrestricted line officers in the billets of Commanding Officer and Executive Officer. The department head billets are filled by unrestricted and restricted line officers (depending upon functional areas) in the rank of commander, through lieutenant. As is normal in a military environment, the department heads report directly to the Commanding Officer on matters of an operational nature, and they report to the Executive Officer on administrative and non-operational matters.

There are also several civilian "communications specialists" (GS-12 through GS-9) attached to the organization who work in staff/ advisory positions to their respective department heads.

Figure 1 illustrates the basic organizational structure of the Naval Communications Station San Francisco.




ORGANIZATION CHART - U. S. NAVAL COMMUNICATIONS STATION SAN FRANCISCO

Figure 1

## B. INITIALLY PLANNED IMPLEMENTATION PROCEDURE

The initial application of MBO was directed at the basic communications station organization down through the department head level, and, within the Communications Department, down to the division officer level. Personnel participating were to include ten military managers (captain through warrant officer) and seven civilian managers (GS-12 through GS-9).

There were several reasons for selecting the respective departments and the military and civilian managers as participants in the implementation process. First, the outputs of the departments included both qualitative and quantitative products. For example, the outputs of both the Administration and Plans Departments are qualitative in nature. The Administration Department is primarily concerned with personnel policies, and the Plans Department focuses mainly on long-range plans, policies, etc. On the other hand, the Communications Department is oriented to a quantitative output, and is primarily concerned with the operational requirement of maximizing the number of messages processed consistent with an acceptable loss/delay rate.

Another important consideration was the depth of the implementation process within the level of organization. In establishing an MBO program within an organization, Reddin [1971] recommends that only the first three levels of management be included in the initial phase. Reddin's premise is that the top three management levels should be

thoroughly indoctrinated and become familiar with MBO prior to its implementation at the lower management levels. In this regard, the civilian communications specialists, although not serving in line management functions, would be considered as the "third management level" for the implementation process. Similarly, as illustrated in Figure 1, the division officers within the Communications Department represent the third level of line managers.

A third reason for selecting the participants was because there exists a dichotomy between the line and staff functions which each manager performs, and which is also a military and civilian dichotomy. In this organization, all of the civilian managers serve in staff positions as advisors to the line (military) managers. In this respect, the intent was to see if civilian managers in the staff positions could effectively establish their own objectives to support their line manager's objectives.

## C. USE OF MBO ADVISORS

During selection of the participating managers, and prior to the implementation planning phase, both Humble and Reddin strongly recommend the use of MBO advisors. Although MBO is primarily the concern of the participating managers, there exists a definite need for a trained advisor who acts, as Frean states, as a catalyst

to original thought. Frean, in his article, "Training MBO Advisors",[24] sees the role of the advisor as assisting line management to introduce MBO. In this respect, the establishment of precise key result areas and key tasks for the individual managers requires the specialized assistance of trained advisors. Another important role of the advisor is the position he assumes during the initial review sessions between the supervisor and his subordinate. As Frean states it:

> Having a third person present, even if he does not participate very actively, helps to ensure that such meetings take place in an atmosphere different from that of normal day-to-day ones.[25]

A third important aspect of the advisor's role is one of coordination. Not only is he responsible for setting up and coordinating the implementation schedule, he is further responsible for establishing and coordinating all "team efforts" required to solve mutual problems. For example, if a problem arises that affects more than one manager or department, some type of "coordinated effort" is necessary to identify and solve this problem. Thus, the role of the advisor is to insure that all levels of management fully understand and follow the principles and procedures involved in the implementation and continuing use of MBO.

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[24] Frean, D. H., "Training MBO Advisors." Humble, J. W. (Ed.), Management by Objectives in Action, p. 190-209, McGraw-Hill, 1970.

[25] Ibid., p. 192.

To assist the managers at the communications station, the authors of this thesis served in the capacity of MBO advisors.

## D. DESIGN OF IMPLEMENTATION PROCEDURE

The implementation procedure we designed for the communications station was primarily based on Humble's work on MBO systems and consists of the following six steps:

1. Introduce MBO to all participating managers;
2. Conduct Key Results Analysis (KRA) of the organization;
3. Conduct KRA and job analysis of each manager and establish routine goals;
4. Conduct KRA agreement sessions between supervisor and subordinate;
5. Conduct first periodic review and reevaluation of KRA between supervisor and subordinate, and begin Job Improvement Plan (establishment of innovative goals) for the subordinate;
6. Continue periodic reviews of progress and conduct performance appraisal review.

According to leading proponents of MBO, the actual process of implementing MBO can proceed in one of two basic directions: (1) Establishment of organizational objectives first and subsequent establishment of successive lower-level objectives (top-to-bottom) or (2) Establishment of the lowest-level objectives first, and subsequent establishment of successive higher-level objectives (bottom-to-top). Both of these methods were considered in the implementation approach, and based on the assumption that lower-level units

exist to support higher-level objectives, the top-to-bottom approach was chosen. The rationale here is that lower-level objectives cannot be defined until higher-level objectives are known.

## E. COMPUTER SIMULATION MODEL

With the six basic implementation steps and the "top-to-bottom" objectives-setting approach established, and prior to the formal presentation of the project to the Commanding Officer of the communications station, a computer simulation of the implementation process was conducted in order to establish time-oriented quantitative guidelines which would be helpful in the implementation process. Specifically, it was desired to simulate the MBO implementation procedures to determine the approximate amount of time that should be allocated for the various steps of the implementation process, and, using this empirical data, prepare a schedule to assist the Commanding Officer in evaluating the time constraints of the implementation procedures.

The overall objectives of the simulation were threefold:

1. To establish quantitative guidelines for use in the actual implementation of MBO;

2. To provide a quantitative analysis of management-level utilization of work hours directly related to MBO;

3. To assist in determining the "priority of MBO" in relation to other operational situations by analyzing the frequency and length of time of interruptions to the MBO implementation process.

The simulation model was based on the premise that each level of management must define its objectives in terms of the next higher-level objectives. This is accomplished by establishing broad organizational objectives and then having each level of management define its own objectives to support the overall objectives.

As previously stated in Chapter II, the actual setting of objectives can be pursued in two different approaches. The first approach is to establish objectives at the individual manager level [Humble, 1970], and the second approach is to establish objectives on a group or team level [Mali, 1972; Reddin, 1971]. This model presents both approaches to provide a quantitative time comparison based upon similar input distributions.

Although there are several simulation languages available which can be used in this model, IBM's General Purpose Simulation System - GPSS/360[26] - has several advantages over the other languages. For example, it enables the user to define the "transaction" which moves through the simulation. In our model, the primary transaction is defined as "one complete implementation of MBO". Other examples of a transaction include an automobile (transaction) on a highway (system), or a customer (transaction) in a barbershop (system).

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[26] A complete description of IBM's GPSS/360 can be found in Thomas J. Schriber's book, General Purpose Simulation System/360: Introductory Concepts and Case Studies.

A second advantage of GPSS is the user's ability to define his own "facilities". Facility is a GPSS term for the capability of providing service to a transaction. Each facility can accommodate only one transaction at a time. In our MBO model, a facility is defined as a particular level of management or an MBO advisor.

Thus, to summarize, the model's "transaction" consists of the process of implementing MBO and it alternately "seizes and releases" several different "facilities" throughout the simulation at different times to represent the objectives-setting meetings and review meetings between the different management levels required in the MBO process.

GPSS also provides for secondary model segments which run concurrently with the main segment. Several secondary segments are used in our model to simulate "higher priority" situations which either delay or interrupt MBO meetings. Finally, a tertiary model segment is used to control the timing of the transaction movement throughout the model. In our model the basic time unit used is the minute.

The operational organization at the communications station as previously illustrated in Figure 1 was used in the simulation. The three levels of management were grouped into the three following management-level categories:

1. Level 1: Commanding Officer and Executive Officer

2. Level 2: Department Heads

3. Level 3: Division Officers and all civilian managers.

This grouping of the managerial levels was done for two reasons. First, it provided for better simulation efficiency by reducing the number of individual management positions from 15 to 3, thereby requiring less facilities to be named and processed throughout the simulation. Secondly, the management levels were grouped along the horizontal lines of the organization chart, thereby maintaining the basic organizational hierarchy. We felt that the objectives-setting processes of MBO would consume approximately the same amount of time for any one of the managers within a given horizontal management level.

The actual MBO implementation process begins at the highest level of management and proceeds towards the lowest levels, with the establishment of objectives at each level. Thus, the rate at which MBO is implemented is primarily dependent upon the following factors:

1. The amount of time required to properly introduce MBO to all participating levels of management.

2. The availability of managerial personnel to attend introductory group meetings, individual KRA meetings, and KRA review meetings.

3. The amount of time required for a given manager to define his objectives.

4. The number and length of time of higher-priority interruptions to the MBO implementing process.

Thus, it can be seen how the series of meetings to implement MBO consists of scheduling and conducting several meetings between Level 1 and Level 2 managers, and further meetings between Level 2 and Level 3 managers.

The System Flowchart (Figure 2) illustrates the basic model segments required for the simulation. As previously described, each transaction in Model Segment I represents one complete implementation of MBO.[27]

In a simulation model of this nature, the input distributions used to approximate advances in time (to represent scheduling and conducting of the meetings) are very important variables. For example, the input distribution used to approximate the time required to schedule a general meeting is based upon the standard normal distribution with a mean of 16 hours or two working days (Figure 3), with a standard deviation of one-sixth the mean, or 2.6 hours. During the simulation run, for example, the amount of time that will be probabilistically determined from the standard normal input could range from 0 hours to 32 hours (1920 minutes).

On the other hand, an exponential distribution was assumed for the interarrival times of the higher priority situations in Model Segment II. Specifically, an exponential arrival-time distribution

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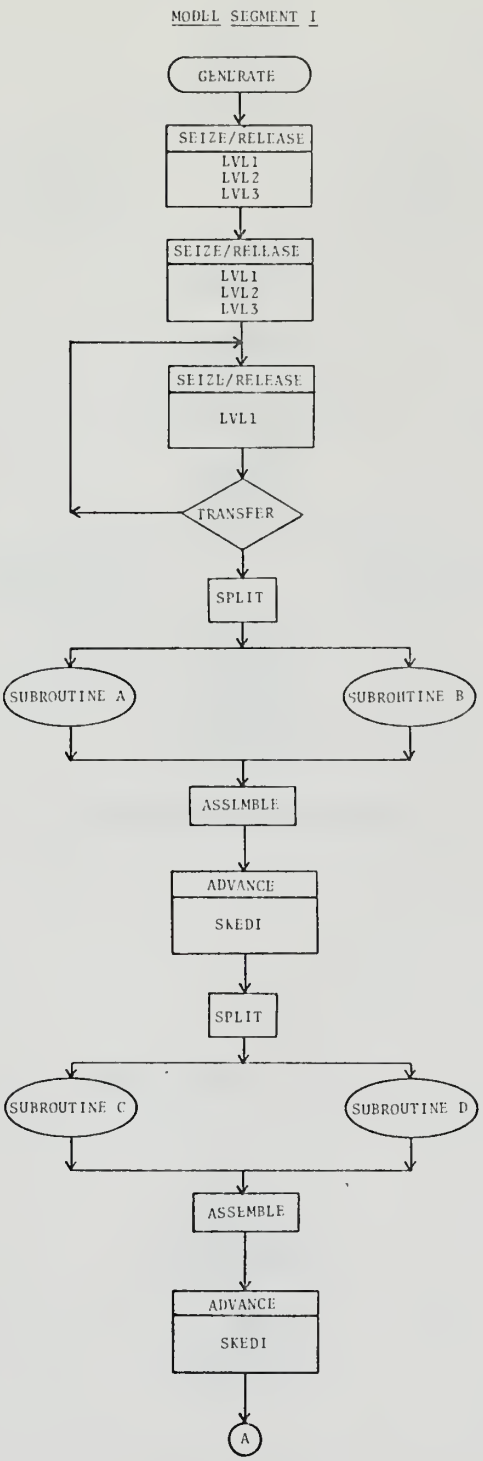
[27] A complete program listing, along with the model assumptions and the input distributions, are listed in Appendix E and the computer printed listing at the end of this thesis.

SIMPLIFILD SYSTEM FLOWCHART - INDIVIDUAL APPROACH




COMMENCE IMPLEMENTATION

FIRST INTRODUCTORY MEETING

SECOND INTRODUCTORY MEETING

LVL1 GROUP KRA MEETING TO SET ORGANIZATIONAL OBJECTIVES

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS FOR GROUP KRA MLETING

ADVISORS WORKING INDEPENDENTLY DURING LVL2 MANAGEMLNT GUIDE PRLPARATION PHASE

LVL2 INDIVIDUAL KRA MLETINGS

ADVISORS RLJOIN TO SCHEDULL KRA REVIEW MLET MEETINGS

ADVISORS WORKING INDLPENDENTLY DURING KRA REVIEW PHASE

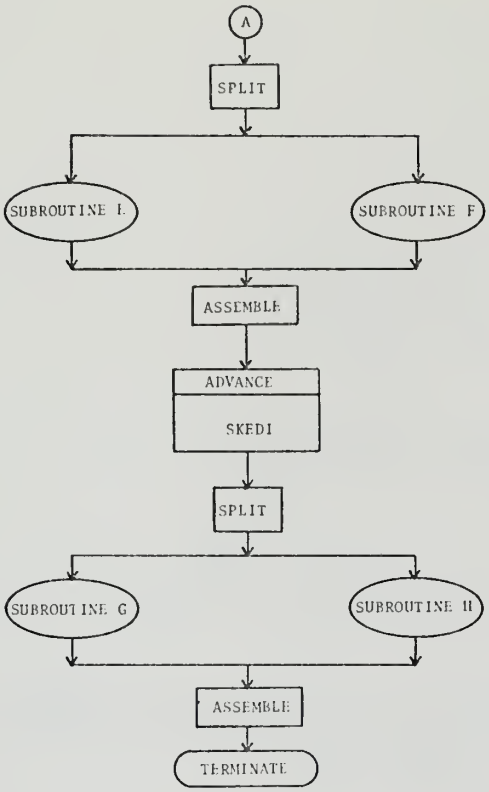
LVL2 KRA REVILW MEETINGS WITH LVL1

ADVISORS REJOIN TO SCHEDULE KRA REVIEW MEETINGS

ADVISORS SCHEDULE LVL3 INDIVIDUAL KRA MEETINGS

NOTE: DLTAILED SUBROUTINE FLOWCHARTS ARE LOCATED IN APPENDIX E

FIGURE 2




MODEL SEGMENTS II, III, & IV

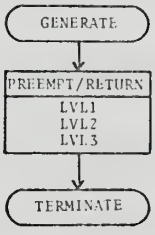



FIGURE 2 (CONTINUED)

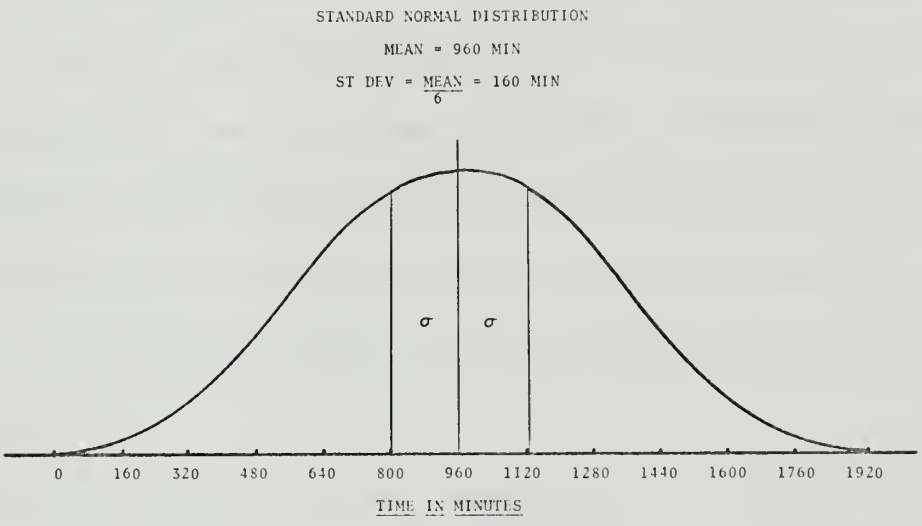



Figure 3

implies that the probability of the next arrival is the same regardless of how many arrivals have occurred in the past.

A summary of the simulation results, based upon the assumed input distributions, is as follows: The amount of time required to implement MBO varied between 67 and 112 8-hour workdays, or about an average of 17 weeks. This means that if an organization of approximately 15 managers in three management levels commenced

implementing MBO, it would take them about an average of 85 days to complete the process. This total time includes all the time lost in scheduling group meetings, etc.

During the implementation period, the three management levels could be expected to devote between 2 percent (Level 1) and 3 percent (Levels 2 and 3) of their time directly to the implementation process.

The simulation results further showed that the lengths of the MBO meetings varied approximately between 90 and 120 minutes, and of the meetings interrupted by higher-priority situations, 50 percent were for 20 minutes or less and 63 percent were for 30 minutes or less.

One of the critical qualitative aspects of the implementation is the Key Results Analysis (Appendix C), and this appeared also to be the critical quantitative aspect of the simulation. For example, in an actual implementation, the ability of a manager to understand the principles of MBO and then apply these principles in analyzing his own job is a critical step in the implementation. If a manager has difficulty in defining his KRA, then additional time and guidance will be required. Similarly, the simulation results indicate that it took 2½ to 8 working days for a manager to complete his KRA. This is not to say that it took a manager 2½ to 8 full working days of his schedule to complete his KRA. What it does mean is that a manager, over a period of days, spent an hour or two actually writing out his

KRA, and then gave additional thought to it over the next couple of days until he was satisfied with his KRA was correct.

The results of this simulation thus became the basis for planning the actual implementation schedule, and also illustrated to the participating managers approximately how much of their time would be devoted directly to the implementation process.

For example, based upon the above results, the following scheduling guidelines were used:

1. At least seven working days was allowed each manager to complete his KRA.

2. A minimum of two hours was scheduled for each meeting.

3. Interrupted meetings would not be cancelled, and would continue when the interruption terminated.

These guidelines were chosen for several reasons. First, to coordinate our implementation plan with our academic schedules, w could only work with the managers one day each week, thus facilitating the seven working days allowed a manager to complete his KRA. Secondly, although the simulation results indicate that the MBO meetings would range in length from 90 to 120 minutes, the higher time limit was selected as the schedule guideline to ensure ample time was available for the meetings, and third, since the simulation results indicate that about 63 percent of the interruptions were for 30 minutes or less, we felt that it would be better to temporarily delay a meeting rather than reschedule it.

The group or team approach to the implementation process was also modeled, and the System Flowchart is shown in Figure 4.

The basic difference between the individual and team implementation procedures is that the MBO advisor either assists the individual managers in establishing their objectives, or the advisor works with functional units or teams of managers to establish unit objectives. The result of team implementation is that there are fewer MBO meetings, but the meetings are usually longer.

The team approach model is based upon the same organization and management levels as presented in Figure 1 and mainly differs from the individual approach model in the number and type (team versus individual) of MBO meetings. However, in the team approach individual managers are not required to prepare their own Management Guides, and this accounts for a tremendous implementation time variance between the two models.

For example, the results of the team approach indicate that overall implementation time is between 25 and 30 eight-hour workdays, or approximately one-third the implementation time of the individual approach. The lengths of the team meetings, as expected, averaged about an hour longer (2½ to 3 hours vice 1½ to 2 hours), however, the scheduling and interruptions time factors were about the same.[28]

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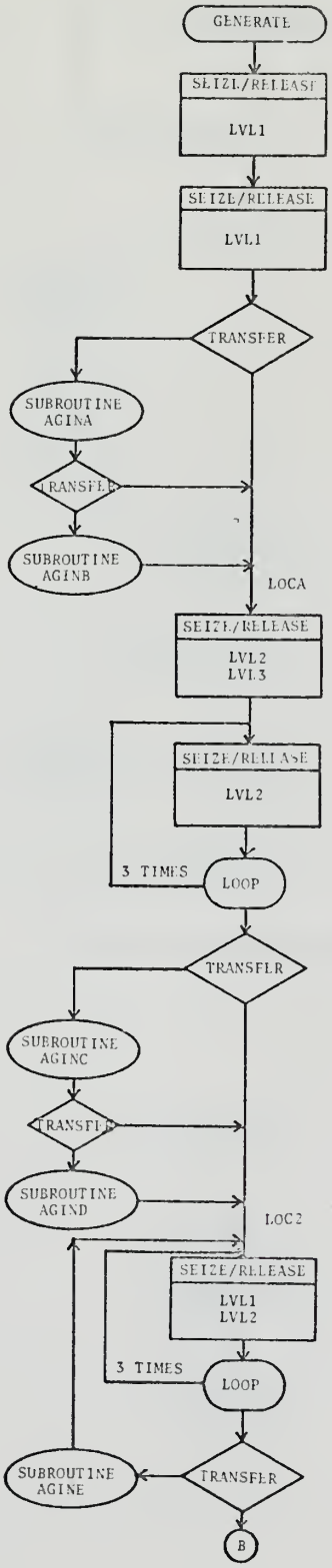
[28]A complete program listing, along with the model assumptions and the input distributions, are listed in Appendix E and the computer printed listing at the end of this thesis.

SIMPLIFIED SYSTEM FLOWCHART - TEAM APPROACH




COMMENCE IMPLEMENTATION

INTRODUCTORY MEETING

GROUP KRA MEETING

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS OF KRA MEETING

INTRODUCTORY MEETING

GROUP KRA MEETING

LOOP 3 TIMES TO SIMULATE 3 SEPARATE LVL2 KRA MEETINGS

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS OF GROUP KRA MEETINGS

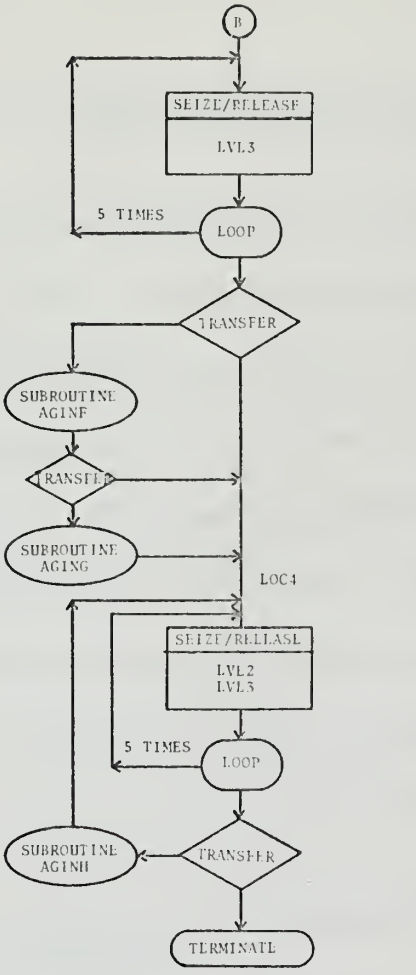
NOTE: DETAILED SUBROUTINE FLOWCHARTS ARE LOCATED IN APPENDIX E

LVL2 KRA REVIEW MEETING WITH LVL1

LOOP 3 TIMES TO SIMULATE 3 SEPARATE LVL2 KRA REVIEW MEETINGS

TRANSFER BLOCK TO SIMULATE INVALID KRA DURING REVIEW MEETING

FIGURE 4




GROUP KRA MEETING

LOOP 5 TIMES TO SIMULATE 5 SEPARATE LVL3 KRA MEETINGS

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS OF GROUP KRA MEETING

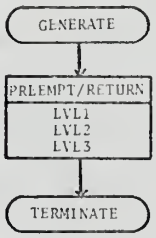
LVL3 KRA REVIEW MEETING WITH LVL2

LOOP 5 TIMES TO SIMULATE 5 SEPARATE LVL3 KRA REVIEW MEETINGS

TRANSFER BLOCK TO SIMULATE INVALID KRA DURING REVIEW MEETING

IMPLEMENTATION COMPLETED

MODEL SEGMENT 11




HIGHER PRIORITY SITUATIONS

DELAY/INTERRUPT MBO MEETINGS

DELAY/INTERRUPTION TERMINATED; CONTINUE IMPLEMENTATION

FIGURE 4 (CONTINUED)

## IV. IMPLEMENTATION PROCEDURE USED

Although the development of our initial plan focused on the communications station organization with individual-oriented objectives, the final implementation plan focused on the Communications Department organization with team-oriented objectives. The reasons behind these changes are discussed, and the final implementation plan developed for the department is presented. Also, a brief discussion of OCMM's Civilian Personnel Management Self-Evaluation Survey is presented as a possible method to measure the effect of any changes in "managerial effectiveness" due to MBO.

### A. MEASUREMENT OF POSSIBLE INCREASED MANAGERIAL EFFECTIVENESS

In an attempt to investigate the possibility that the MBO management system might provide the impetus for increased managerial effectiveness, the Self-Evaluation Survey was administered to the personnel at the communications station prior to the start of the implementation process. We intended to readminister the same survey during the last phase of the project to determine if there was a change in managerial effectiveness. However, we were unable to readminister the survey in sufficient time to include a before-and-after analysis in this thesis. Our Thesis Advisor will conduct the

analysis when the results of the second survey are available. This before-and-after evaluation is to be conducted by using a survey designed and provided by the Program Evaluation Branch of the Office of Civilian Manpower Management (OCMM).[29] The survey consists of a self-administered questionnaire which is designed to provide Navy activities the means for evaluating the effectiveness of their personnel management programs. The questionnaire consists of 65 statements which are divided into eleven Program areas as follows:

1. Merit Promotion
2. Training
3. Labor-Management Relations
4. Equal Employment Opportunities
5. Classification and Pay
6. Position Management
7. Job Information and Performance Evaluation
8. Communication
9. Supervision
10. Employee Services
11. Morale

The survey statements are designed to measure employees' and supervisors' attitudes towards the eleven program areas and are divided into two forms for this purpose. Separate surveys for employees and supervisors are issued in booklet form. The 65 statements have been developed to avoid personnelist jargon and to orient the language to the respondent's point of view so that the short

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[29]Masse, S., "The Questionnaire Survey Technique," The Journal of Navy Civilian Manpower Management, p. 6-11, Fall 1971.

statements can be responded to by indicating "yes," "no" or "undecided" on a separate answer sheet. For example, a typical statement for an employee response in the area of communications is: "I am told promptly when there is a change in policy, rules or regulations that affect me." In the same area, the supervisory booklet has the statement: "I notify my employees in advance of changes that will affect them." It is through analysis and comparison of the responses of both supervisors and employees that observations on management effectiveness are obtained.

Since wage grade workers near the retirement age may view some personnel programs quite differently from young white-collar workers, an analysis of the replies should be able to provide useful information for possible future action. Subsequently, although a person's responses are anonymous, the questionnaire requests essential identifying biographical data on each participant, such as age, length of service, blue collar or white collar worker, etc., and this type of information can be important in assessing program effectiveness.

Since the intent of the questionnaire was to attempt to measure any change in managerial and employee attitudes due to a change in their "working environment" and to further validate the usefulness of the questionnaire in determining before and after managerial effectiveness, a control group outside the communications department

was used to establish a reference for measuring changes in effectiveness.

## B. COMMAND INDOCTRINATION AND PROJECT ACCEPTANCE

The first phase of the indoctrination began with a formal presentation to the Commanding Officer. This presentation was designed to introduce the basic principles of MBO and to answer any questions regarding MBO's usefulness in an operational environment.

The major part of the presentation consisted of showing three films which explained the basics of MBO.[30] The films dealt broadly in the areas of an organization establishing its long-range objectives, the need of a manager to properly define his job, and the importance which should be placed upon proper performance appraisal and managerial development. This three-film introduction provided the Commanding Officer with general knowledge and specific facts on how management by objectives is being applied in the business world.

After viewing the films, the proposed MBO implementation package was outlined to the Commanding Officer, along with recommendations that five of his eight departments participate. It was suggested that these five departments were the typical departments

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[30]Humble's MBO-system includes a series of six films which are designed to assist in the introduction and implementation of the MBO management system. These films are distributed by BNA Films, 5615 Fishers Lane, Rockville, Maryland, 20852, under the title, "The Humble MBO Film Series."

at a communications station, and further that the fifteen managers involved provided a broad range of military and civilian managerial experience to work with.

At the conclusion of the presentation, the Commanding Officer voiced concern over the broad scope of the pilot project, and suggested a more detailed approach be made with a smaller number of participants. He further suggested that since the output of the Communications Department has the most noticeable effect on the day-to-day operations of the communications station, he would prefer to see MBO implemented within the Communications Department. More specifically, he was concerned with the benefits to be accrued in the short run; that is, how MBO would help him to eliminate the day-to-day "brush-fires", while at the same time improve the overall effectiveness of the communications station. Our reply was forthright. MBO is not intended to replace their present management system, but rather to introduce a new dimension - planning - to their present system. With proper application of the analysis and job improvement aspects of the MBO system, combined with top-management guidance and interest at each management level, subordinate managers are encouraged to investigate potential problem areas prior to their occurrence, and offer suggestions for improvement.

Although the Commanding Officer authorized us to proceed with the MBO project, it was on a much narrower scope than we anticipated.

Our main concern at this point was whether or not effective top-management support would be evident to the participating managers within the Communications Department. The Commanding Officer indicated that he did not desire to establish any objectives at his level to preclude the possibility of "suppressing" any initiative on the part of the participating managers.

Fortunately, no changes in the implementation process were required, and the project was to proceed according to the original six steps as previously defined.

The participating managers now included the following: 11 military managers in the rank of lieutenant commander through chief petty officer, and 4 civilian managers, GS-11 through GS-7. We were concerned whether or not the lower-level military and civilian managers could contribute useful ideas during the implementation process, and also how much benefit they would receive from the project. We believe this aspect of the project ultimately depends on how much an individual manager could disassociate himself from the "inputs" of his job and concentrate on the "outputs" of his job. For example, a manager's "job input" might be to "maintain equipment in a high state of readiness," wherein his "job output" would in reality be defined as "equipment availability maintained at 95 percent." This job output is readily measurable and can be equated to a specific organizational objective, as well as provide an "area of improvement."

## C. DISCUSSION OF PROCEDURES USED

The general introduction of MBO to the participating managers of the Communications Department proceeded in the same manner as the introductory presentation to the Commanding Officer. However, at this meeting, only the two Humble films pertaining to establishing long-range objectives and defining the manager's job were shown. The third film on performance appraisal and managerial development was not shown at this time since the performance appraisal aspect of MBO comes much later in the implementation process, and after viewing the first two films during the first hour, the group's attentiveness was less than desired.

During the discussion period that followed, a notebook entitled the "Management Guide" was distributed to each manager (Appendix D). The Humble-MBO system recommends development of The Management Guide, and, later on, The Job Improvement Plan for each manager. The Management Guide consists of two separate forms, the first of which identifies the manager, his position, and the overall scope and purpose of his job. The second part of the Management Guide is provided to assist the individual manager in establishing his Key Result Areas (Appendix D), or as Reddin calls them, "effectiveness" areas.

Briefly, Key Result Areas are those 20 percent of the tasks that take up 80 percent of a manager's time.

Included in the notebook along with the Management Guide was a six-page descriptive handout which provided each manager with definitions and examples to assist him in preparing his Management Guide. Although the final form of the Management Guide would be prepared with the assistance of an advisor, it was felt that each manager would have a sufficient knowledge of MBO from the films and discussion period, along with the Management Guide handout, to initially prepare his own Management Guide.

To assist in coordinating the implementation procedures and scheduling of meetings, a critical path schedule was produced as shown in Appendix D. This schedule listed billets, dates, and times for KRA meetings with advisors and for KRA review meetings with supervisors. The purpose of the schedule was to: (1) Monitor the overall progress of the implementation procedures; (2) Advise all managers of their respective meetings; (3) Prevent undue delay in scheduling of the meetings; and (4) Define the critical path and pinpoint any future meeting schedules which may overburden a manager in a given period of days.

During the initial phase of the implementation procedures in which we reviewed the Management Guide with individual managers, it became quite evident that the average manager could not easily disassociate himself from his job to take an objective look at it. For example, when asked to define "the overall scope and purpose of

his job," one manager very readily drew upon his many years of military experience and produced a detailed outline (two pages) of every aspect of his job, when only a brief statement on the overall scope and purpose was desired. In this instance, although written without the aid of an organizational manual, the subordinate manager listed every aspect of his job in the standard format (duties, responsibility, authority) of a military organization manual. Inasmuch as MBO is predicated on only those things which a manager has to do well in order to succeed, only those job functions important to the job should be listed.

Based upon the group response of the first introductory meetings, and our initial advisor-manager sessions, we decided to alter the implementation procedure from the one-on-one advisor-to-manager approach to the "team approach". This decision was brought about by several factors. First, during the initial meetings the managers were having a difficult time understanding the need to look at their jobs from a different approach; that is, they felt they were doing a "successful" job now so why change? Second, the various replies in group sessions encouraged more participation from all those present. And, third, the managers, especially on the military side, more readily identified with their divisional units instead of their individual positions.

As stated previously the group or team approach[31] includes the use of small groups of managers to conduct a Key Results Analysis of their unit, and then systematically develop their unit objectives. We looked for the group participation approach to the MBO process to foster an increased awareness in each manager to more objectively look at his job in relation to the unit's objectives. As Reddin puts it, among the outputs of a team objectives meeting are:

1. The team role is better defined.
2. Managerial effectiveness areas are established.
3. Team decision making is improved.
4. Motivation increases sharply.
5. Individual jobs are enriched.[32]

The implementation approach was therefore revised as follows:

1. Conduct departmental-level group Key Results Analysis of the department.
2. Through group effort, establish objectives for the department, and determine how each departmental Key Result area is supported by divisions within the department.
3. Conduct divisional-level group discussions to determine Key Results Areas for each division in support of those departmental objectives which the division supports.

The first departmental-level group Key Results Analysis (KRA) meeting was attended by ten managers representing the department level and three division-level units. Attendents at this meeting included the functional unit supervisors and their leading assistants.

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[31] See Chapter II, Section B for a discussion on the team approach.

[32] Reddin, W. J., op. cit., p. 154.

The Communications Officer began the meeting by listing three criteria which each key result area must meet in order to be valid. These criteria are:

1. Leads to success or failure of the organization.
2. Areas must be separable for organizational planning.
3. Items must be quantifiable.[33]

With these criteria listed on the blackboard, the Communications Officer started the discussion with the suggestion of "Operational Communications - DCS" as a possible key result area for the department. This KRA was originally suggested by us to the Communications Officer only as an example of what a KRA might encompass, with no intent of it becoming a final departmental KRA. A second example of a KRA presented to the Communications Officer was "Operational Communications - Fleet", and this suggested KRA also appeared on the blackboard.

After much discussion, the departmental team came up with the following seven KRA's divided into the two categories as listed:

1. Operational - Provide reliable, rapid, and secure communications
    a. Operational communications - DCS
    b. Operational communications - Navy Tactical
    c. Commercial Refile
    d. Communications Assistance Team Visits
2. Personnel Administration/Management
    a. Training/Development
    b. Welfare/Morale
    c. Manning/Utilization

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[33]See Appendix C.

At this first objectives-setting meeting, we participated very little in the establishing of the departmental KRA's. However, as we realized during later meetings, we had to provide more guidance than originally anticipated. If left to their own accord, the managers had a tendency to approach certain areas in too much detail and get bogged down on irrelevant material. In this regard, the advisor is definitely an asset in keeping the discussions on the right track.

The group participation was much better than anticipated. Once suggestions were made regarding possible KRA's, pros and cons were immediately forthcoming from the group to support or change the suggestion. On some occasions, the originator of a suggestion acquiesced when dissenting arguments were given as to why a particular area should not be a KRA of the department.

After this first meeting, the KRA's established were analyzed by us and the Communications Officer and it was determined that all of them did not meet the criteria originally established for a key result area, i.e., relevant, independent, and measurable (Appendix D).

Two additional department-level meetings were conducted before acceptable KRA's were established. At these meetings, the following ideas were suggested to the managers in order to assist in establishing valid departmental key result areas:

1. Group members were to discuss KRA's on a departmental level vice the independent divisional level.

2. Old Navy cliches were unacceptable as valid KRA's ("Service to the Fleet," "Rapid, Reliable, and Secure Communications," etc.).

At the last of these two additional meetings, a completely new approach to departmental key result areas was proposed by the advisors, and during the final meeting, the advisors suggested approaching the analysis by asking what it was the station did and what were the results desired in terms of the output from the station. Key result areas for the Communications Department could then be viewed as contributions to this output. As a result of this clarification as to why the Communications Department exists, the following valid departmental key result areas were established:

1. Message reception

2. Message processing

3. Message transmission.

That is, the department basically does no more than receive, process, and transmit messages.

With these key result areas established, it was less difficult to determine Key Tasks, Performance Standards, and the Control Data required for each Key Result Area. Figure 5 shows the complete Key Results Analysis for the Communications Department.

At subsequent lower level MBO meetings, an advisor met with each divisional supervisor and his leading assistants in order to

| KEY RESULT AREAS/ KEY TASKS | PERFORMANCE STANDARDS | CONTROL DATA |
|---|---|---|
| 1. RECEPTION | | |
| a. Ensure reception of those messages destined for this station for action or relay. | a. 100% Reliability | a. Non-delivery acknow. |
| b. Ensure circuit continuity for those circuits passing through this station. | b. No unscheduled outages due to equipment or management of circuits. | b. DATAREP/ MANREP DCA 310 Reports/ DNC 14 Freq Pred Guide/ Freq Qual messages |
| 2. PROCESSING | | |
| a. Ensure in-house message processing is within specified time limits. | a. (1) 100% Reliability<br>(2) Within prescribed time stnds. IAW ACP 121 or higher authority | a. Non-dlvy<br>b. Excessive delay<br>c. DATAREP/ MANREP DCA 310 Reports/ DNC 14 Freq Prod Guide/ Freq Qual messages |
| b. Ensure circuit continuity for those circuits passing through this station. | b. No unscheduled outages due to equipment or management of circuits. | |

COMMUNICATIONS DEPARTMENT KRA

Figure 5.

| KEY RESULT AREAS/ KEY TASKS | PERFORMANCE STANDARDS | CONTROL DATA |
|---|---|---|
| 3. TRANSMISSION | | |
| a. Ensure transmission of those messages received for relay or originating at this station. | a. 100% Reliability | a. Non-dlvy acknow. |
| b. Ensure circuit continuity for those circuits passing through this station. | b. No unscheduled outages due to equipment or management of circuits. | |

Figure 5. (cont)

establish team objectives for each division in support of the departmental objectives already established. During these meetings, each division was to establish key result areas to support those departmental key result areas which were a function by the output of a division. For example, during the group Key Results Analysis for the Technical Control Division, it became apparent that the departmental key result area, "Circuit Continuity" (Items 1.b, 2.b, and 3.b in Figure 5), was entirely supported by the Technical Control Division, and this then became their primary divisional key result areas. (Figure 6)

Since the division level managers had attended the key results analysis of the departmental meetings, they more readily adapted to the objective-setting requirements and needed less guidance in conducting the meetings.

| KEY RESULT AREAS/ KEY TASKS | PERFORMANCE STANDARDS | CONTROL DATA |
|---|---|---|
| 1. CIRCUIT CONTINUITY | | |
| a. Ensure circuit continuity for those Navy tactical circuits originating from, terminating at, and interfaced with this station. | a. Landline: 100% traffic quality availability<br><br>b. R/F Path: 85% traffic quality availability | a. DATAREP/ DAILY CKT. Status Reports/ CAMS Spot Reports/ Daily Equpt. Status Reports |
| b. Ensure circuit continuity for those DCS circuits originating from, terminating at, and interfaced with this station. | a. Landline: 100% traffic quality availability<br><br>b. R/F Path: 100% traffic quality availability | a. Daily DCS Status Report/ Circuit Layout Records<br><br>b. DCS 55-1 Reports (as occurring)/ Circuit Layout Records |

TECHNICAL CONTROL DIVISION KRA

Figure 6.

# V. EVALUATION AND RECOMMENDATIONS

This section analyzes the results of the MBO implementation at the communications station and lists several problem areas encountered which affected these results. The question whether these problems are peculiar to the communications station environment is addressed, followed by recommendations for future work.

## A. RESULTS OF THE MBO PROJECT

Based upon our presumption that the managers participating in the pilot project would have had more time to devote to MBO, we had hoped to develop complete key result areas from the Communications Department and its three main divisions - Technical Control, Fleet Center, and Electronics Maintenance. However, we only had time to analyze operational key result areas for the department as a whole and only one division. Further work is presently being conducted by Communications Department personnel to complete the implementation project.

Since lack of time prevented completing the MBO implementation, and therefore curtailed the readministration of the Self-Evaluation Survey (Chapter IV, Section A), only our personal observations of any change in managerial effectiveness are presented. These observations of the benefits derived and the problems encountered

are based upon the comments and actions of the participants during the various phases of the implementation project.

Although we had established specific objectives for the MBO project, it became evident as the implementation progressed that all the project objectives would not be attained. Obviously the difficulties encountered with the individual approach led only to regeneration of task-oriented job descriptions rather than results-oriented, and individuals tended to consider their activities as fulfilling certain tasks rather than contributing towards a higher organizational goal or objective.

Once the team of department managers got together, it was obvious that there was a variety of opinions as to the exact objectives of the communications station and the communications department. As previously stated, we suggested a route of analysis towards clarifying the overall communications station objectives (i.e., reasons for its existence) with a parallel analysis of departmental and divisional objectives.

After several iterations of the key results analysis, the departmental objectives as shown in Figure 5 were derived. However, these represent only a portion of the key result areas, as the Communications Officer stated that he had other key result areas in the personnel administration and training categories which demanded much of his time and attention. With the operational objectives

already established, he stated that he felt better prepared to develop the departmental administrative and training objectives. This technique of evaluating administrative and training objectives in view of operational objectives provided him with a much better insight into the overall scope of his department's objectives. Having also participated in these meetings, the division managers stated that they had a better appreciation of their division's positions and responsibilities relative to that of the communications department.

An important step in the MBO implementation process is the KRA review meeting. As stated earlier, the prupose of this meeting is twofold. First, it is essential that the Communications Department's objectives support those of the station, and secondly, by approving the department's objectives, the Commanding Officer is effectively stating that if these results are achieved, he will be completely satisfied with the department's output.

The initial KRA review between the Communications Officer and Commanding Officer covered only key result areas of operational communications, and was considered a reasonable milestone. The Commanding Officer agreed with the alignment of key tasks as they supported his viewpoint on the Communications Officer's contributions to the station's objectives. Although minor revisions or additions were made (primarily in the Control Data area), this meeting exhibited rather well the two-way flow of communication that is supposed to

exist in MBO between supervisor and subordinate. For example, the Commanding Officer felt that the Control Data "Non-delivery Acknowledgment" on a missing message was a negative or after-the-fact approach to check for missing messages. The Communications Officer discussed the problem of presently not having enough personnel for complete in-house message traffic verification. The Commanding Officer agreed, and said he did not want to impose any unnecessary checks. The Communications Officer stated he would give additional thought to this area.

The Commanding Officer further commented that when the Communications Officer addressed the personnel administration and training aspects of his key results analysis, he considered integrating race relations into his key result areas. The Commanding Officer considered this area to be of prime importance and felt that an MBO analysis would provide direction in establishing a race relations program.

## B. DISCUSSION OF IMPLEMENTATION PROBLEMS ENCOUNTERED

An analysis of the MBO project reveals five areas which we feel adversely affected both the progress and the level of the results obtained.

1. Time. Although the overall length of time which we scheduled for the implementation project may originally have been sufficient,[34]

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[34]See Humble [1970] and Reddin [1971] for various implementation schedules.

the fact that we were only available to assist as advisors one day per week severely limited our progress. The inability or reluctance of the individual managers to devote some time during the week to MBO caused the implementation to become a once-a-week ritual, which lacked the smooth continuity necessary during the implementation process.

2. Command Support. The Commanding Officer agreed with the principle of MBO providing a new and systematic approach to communications management and assured us of his support for the project, however higher-priority commitments prevented him from attending any of the Communications Department's meetings. We felt his presence at the introductory meeting and an occasional word of encouragement to his participating managers would have helped the project significantly. In almost every incidence where MBO has failed in previous applications, there was also a lack of top management support [Granger, 1970; Humble, 1970; Mali, 1972; McConkey, 1972; and Odiorne, 1965].

3. MBO In-House Advisors. As discussed earlier, it is highly recommended to use well indoctrinated in-house MBO advisors chosen from within the organization. At the beginning of the project at the communications station, consideration was given to training an advisor. However, due to the manning situation and tempo of daily operations, qualified persons could not be spared by the communications department to devote full time to learning and implementing MBO. The

advantage of having an insider, familiar with the work environment and the personnel employed, cannot be overlooked. We definitely felt there was a dissonant reaction to our presence, which could have been overcome to a great degree if there had been more command support as mentioned above. The time element was again a factor here also because we felt it took too long to build up confidence with the lower managers. Undoubtedly, an in-house advisor would be much better at analyzing interpersonal situations and also be more sensitive to the tempo of group operations [March and Simon, 1958].

4. Level of Management Participating. Both Schaffer [1964] and French [1969] describe lower level management and firstline supervisors as being constrained in their work activities at their limited or narrow job structures. We observed this also where the Chief Petty Officers attempted to enter into the discussions during the group key results analysis meetings. This is similar to Schaffer's observation of lower level managers:

> ... they are aware of limitations of divided responsibilities but the pattern is so deeply engrained that few know how to step out of their role and deal with colleagues or with the chief executive in broad terms that go beyond their job.[35]

Although MBO offers a change in rules to permit them to make contributions to the group's objectives [Schaffer, 1964] this is not easily

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[35]Schaffer, R. H., "Managing by Total Objectives," AMA Management Bulletin, 1964, p. 9.

done and requires time. It is obvious that these firstline supervisors and managers can offer years of technical and operational experience to task analysis, but it is difficult for them to think across functional lines of responsibilities. It may be best to bring in such managers at a later point in the development of group objectives during the job improvement phase after broad objectives have been set by the department and division managers.

5. Resistance to Change. We observed a general feeling of resistance towards the project which can be attributed to a variety of factors, some of which have already been discussed - an outside image of the MBO advisors; structured thinking on the part of lower level managers; interruption of old style of managing. These factors of resistance to MBO were also observed by Humble [1970]. Additionally, time can be a factor of resistance in promoting participative management if not allowed to proceed slowly enough to allow the members an opportunity to view the new system [Likert, 1961]. It is obvious that time is an essential feature to all aspects of implementing an MBO program.

## C. OVERALL EVALUATION OF THE STUDY

One of our initial objectives in this study was to determine if problems encountered in implementing MBO in a communications station environment would differ from those experienced in other applications. The literature review indicates the five problems

discussed above occur in almost every text written specifically on implementing an MBO program [Humble, 1970; Mali, 1972; Odiorne, 1965, and Reddin, 1971]. It seems to us that the organizational function and operational environment, the structure of organization and the type of personnel associated with the typical Naval communications station would not offer any more involvement or complexity to MBO implementation than found in any other successful application of MBO discussed by these authors. There does exist, however, the recognized special authority that embraces the military organization which differentiates it from its civilian counterpart. The point here is that any change from current management practice to one that is more participative does not necessarily weaken the authority of the superior. As we have illustrated previously, authority relationships and acknowledgment of responsibilities are actually strengthened during the MBO process [Likert, 1961; Schaffer, 1964]. From our observations, the most difficult level to convince of this are those firstline supervisors and middle managers with long periods of military service in specialized areas, i.e., Senior and Master Chief Petty Officers, and Warrant Officers. We feel that bringing these individuals into the MBO program will offer the greatest challenge to the implementation process, but it is necessary to counter narrow-gauge attitudes that concentrate each manager's attention solely on his own group's fraction of contribution to the organization's success.

We agree with Schaffer [1964] that this may best be achieved by firmly establishing MBO at the top of the organization before working into the lower levels.

Referring again to our objectives set early in this study, we attempted to examine how the application of MBO would solve some of the specific problems facing Naval Communications. Although the project was not fully implemented, the partial results achieved support the argument that MBO is possible within the communications environment. The problems of organizational planning, coordination between and within activities and development of managers have been approached and solved on various levels previously by companies using MBO. It is on this basis that we suggest that MBO can focus directly on the problems outlined by the Chief of Naval Operations' Industrial Advisory Committee on Telecommunications (CIACT) and Rear Admiral Gravely.

## D. RECOMMENDATIONS

Organizations in both private and government sectors [Pacific Telephone and Telegraph Company, 1966, and the CIACT Report, 1972] recognize the need for more effective and efficient operation and management of personnel resources. With this recognition also comes the reality that it is the total organization that is involved and it calls for a total process [Bennis, 1970]. We feel that MBO and Assessment Centers have the necessary elements to form such a

total approach. In the course of our research of MBO, the Assessment Center technique (Appendix A) was studied as a supplement to MBO procedures in appraising and completely identifying personnel potential, but was not part of our project at the communications station. We suggest that further study be undertaken to examine the feasibility of combining the potential appraisal of the Assessment Center technique with the performance appraisal of MBO.

Our second but most important recommendation is that a full and complete application of MBO be implemented at a naval communications activity. It is essential that three or four review cycles be completed to adequately judge the merits of MBO. The use of full-time trained in-house MBO advisors during the implementation and later review stages should avoid the problems encountered in our project. However, the success of an MBO program calls for full support and encouragement from the command level and should be monitored from the headquarters level. Not only should the application of MBO be examined at an activity level, but it should also be appraised from a systems-wide applicability. Many of the problems facing naval communications extend throughout the system. We feel that MBO is a viable and workable integrative management procedure for use within the entire naval communications system.

# APPENDIX A

## ASSESSMENT CENTER TECHNIQUE

The term "assessment center" was first related to Murray during his early work in personality research in the 1930's. In 1943 he was attached to the Strategic Service Office's (OSS) Assessment Center which is generally acknowledged to be the first attempt in the United States to establish such an undertaking in conformity with the so-called organismic (Gestalt) principles [U.S. OSS Assessment Staff, 1948]. In 1956, under the work of Bray, the American Telephone and Telegraph Company developed a research model of an industrial assessment center for use in its Management Progress Program.[36] The first non-industrial assessment center was developed at Michigan Bell in 1958 and labelled the Personnel Assessment Program (PAP). This was basically an adaptation from the Management Progress Study which could be operated by specially trained line managers.

From a review of the literature it must be recognized that AT&T, under Bray, has been the leader in industrial application of the

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[36]The Management Progress Study is a longitudinal study, begun in 1956, of the development of young men in a business management environment. Its purpose was very general - to learn more about the characteristics and growth of men as they become, or try to become, middle and upper managers. The assessment center per se was only one of several research methods being used for assessment of management potential.

assessment center technique. Other companies have quickly followed suit since about the mid-sixties. Firms such as IBM, General Electric, J. C. Penney Company, Standard Oil and Sears and Roebuck have established assessment centers and it has been recently estimated that more than one hundred large and small firms are currently using this technique and that it is receiving more and more attention [Slevin, 1972].

The key to the assessment center concept is the broad band approach of combining predictors in an attempt to get an over-all assessment of human behavior and personality. The OSS Assessment Staff summed up their approach by calling it

> ... the multiform organismic system of assessment: "multiform" because it consists of a rather large number of procedures based on different principles, and "organismic" (or "Gestalt" or "holistic") because it utilized the data obtained through these procedures for attempting to arrive at a picture of personality as a whole; i.e., at the organization of essential dynamic features of the individual. The knowledge of this organization serves as a basis both for understanding and predicting the subject's specific behavior.[37]

From this observable-wholeness concept, the OSS Staff devised a series of steps, based on one or more psychological principles, which would produce exercises that would allow such observations. These steps follow the logic that to predict future performance on some job, it is necessary to obtain identified observable human

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[37]U.S. OSS Assessment Staff, Assessment of Men: Selection of Personnel for the Office of Strategic Services, Rinehart and Co., 1948, p. 22.

behaviors required by that future job and devise exercises which would require those same observable behaviors.

> Key managers familiar with the positions for which the candidates are to be assessed should discuss this among themselves, and the center developer should ask them questions like these: "Can you describe the behavior of successful and unsuccessful people in the positions in question?" "How do you evaluate people for this position?" "What are the tasks to be performed?" "What characteristics will be needed in our managers 10 years from now?" After a list has been compiled and agreed upon, another meeting should be held to determine which of these characteristics can be assessed adequately on a man's current job. After eliminating these from the list, the characteristics that remain become the objectives of the assessment center program, and the assessment center exercises should be selected to bring out these behaviors.[38]

Albrook's experience in companies practicing assessment centers supports this approach. He says the search for what kind of behavior the company wants to look for is entirely pragmatic [Albrook, 1968].

After the completion of the exercises and tests assessors apply ratings and rankings to individual candidates and make comments on predicted ability based on their judgments. They then must agree on an over-all judgment on each man, rating him in such categories as "more acceptable", "acceptable", "less than acceptable" or "unacceptable" for promotion. These results are then passed back to the candidate's supervisors at the company. The results are then integrated with appraisal information (based on the candidate's job performance) for decision making on the candidate's promotion.

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[38]Byham, W. C., "Assessment Center for Spotting Future Managers", Harvard Business Review, July-August, 1970, p. 157.

An important aspect of the assessor's results-report is that it only represents information to the decision maker and is not designed to produce thumbs-up or -down determinations by itself. In theory the center functions in a purely advisory role, but its verdict is usually persuasive. If a candidate's superior feels strongly that the assessment is wrong he may be promoted anyway [Albrook, 1968].

A point the OSS Staff was well aware of is that results from all observations (assessor's) must be combined judgmentally and not statistically in order to allow proper judgments by persons outside the assessment center to make actual choices in selection:

> To turn in a personality sketch composed entirely of accounts of the subject's behavior in a variety of situations is scientifically useless, if not harmful, unless it goes to an officer who is more talented and experienced than the assessor who made the observations. A fact is fact, and as such provides no grounds for predictive judgment. In order to predict one must at least infer, implicitly or explicitly, that a persisting disposition or attribute of the personality lies behind the fact. It is the professional function of the psychologist to make inferences of this sort as well as to report the observations which justify them. In writing sketches for laymen, facts which do not justify inferences should be omitted, because the layman will certainly make his own inferences, automatically if not deliberately, and if these are unjustified, the decisions that flow from them may be unfortunate.[39]

There are a variety of ways to structure an assessment center, each application designed to fit the needs of the organization. Byham points out that "there is no right or wrong way to structure a center".

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[39]U.S. OSS Assessment Staff, op. cit., p. 54.

Commonly, the actual program operation takes up to three days, although there exists one-day programs. Additionally, candidates are almost always grouped to allow for assessment of group interaction, and numbers run from 6 to 18, with 12 being the most often used group size. The number of assessors varies from a ratio of one-to-one with the candidates to a one assessor-to-four candidates. The qualifications and backgrounds of the assessors vary throughout industrial applications. Most often they are a mixture of professional psychologists and semi-indoctrinated company personnel with job experiences one level above that of the person being assessed. AT&T uses about 2 professionals per every 4 to 8 company people as assessors, but this varies considerably with some centers using no professionals for observation but only for training the company assessors. Company people are rotated (often as a team) through the centers on a collateral duty basis [Byham, 1970 and Campbell and Bray, 196[illegible].

Byham presents a three-day schedule of events which is based largely upon the J. C. Penney's program:

Monday

Orientation
Business Game
Interview by assessor
Psychological testing
Assigned role group discussion
Study employment interview procedures and applicant resumes for following day exercises
Receive "Irate Customer Phone Call"

Tuesday

In-basket exercise
Conduct employment interviews
Group discussion disciplinary cases
Prepare written financial recommendations

Wednesday

Present individual financial analysis
Group reconciles and consolidates a single analysis
In-basket interview
Candidates rate each other.[40]

Byham has also devised a two-day program which is presented in the Training and Development Journal:

Day 1:

Orientation meeting
Management game with four-man teams
Background interview for one and one-half hours
Group discussion on management problem
Individual fact-finding and decision-making exercise

Day 2:

In-basket problem followed by interview concerning the problem completion
Assigned role on a leaderless discussion problem
Analysis, presentation and group discussion problem[41]

Jaffee outlines a one-day program which he feels can be accomomplished without too much difficulty:

---

[40]Byham, op. cit., p. 162-163

[41]Byham, W. C., "The Assessment Center as an Aid in Management Development", Training and Development Journal, December, 1971, p. 10-22. Source taken from MBA Thesis by W. B. Cowan, Jr., An Evaluation of the Usefulness of the Assessment Center in Personnel Selection and Promotion, George Washington University, May 1972.

| | |
|---|---|
| 8:30-8:45 | Introduction |
| 8:45-10:45 | Assigned role group discussion |
| 10:45-11:00 | Break |
| 11:00-12:00 | Business game |
| 12:00-1:00 | Lunch |
| 1:00-2:00 | In-basket exercise |
| 2:00-2:30 | Interview |
| 2:30-3:00 | Break |
| 3:00-4:15 | Leaderless group discussion[42] |

Personnel promotion is the main use of assessment center results because of the emphasis on predictability and potential which the approach is designed to evaluate. Most validity studies of the technique have concentrated in this area. From AT&T's original sample in 1956, 355 assessees were in the study group. The objective of the assessment at that time was to predict the likelihood of the assessees progressing to middle management within ten years [Bray and Grant, 1966]. The time was cut to less than eight years with the results being tabulated in 1965 as follows:

Progress in Management by Level[43]

| Education Background | Number | Management Level Achieved (Percent) | | |
|---|---|---|---|---|
| | | 1 | 2 | 3-4 |
| College | 125 | 6 | 64 | 30 |
| Non-college | 144 | 45 | 42 | 13 |
| Both | 269 | 27 | 52 | 21 |

---

[42] Jaffee, Cabot L., Effective Management Selection, Addison-Wesley Publishing Co., 1971, pp. 15. Source same as footnote 41.

[43] These charts are a combined and more general version of the charts presented by Bray and Grant [1966].

As indicated, the college graduates progressed more rapidly, but not unexpectedly so, as they were originally recruited as having middle management potential, i.e., level 3-4, [Cabot, 1965 and Bray and Grant, 1966]. A further refinement of the same data shows specific levels of management (level 1 is lower or first line management, etc.) achieved by the assessees:

Assessment Predictions Versus Progress[43]

| Education Background | Assessment Prediction and Number | | Management Level Achieved (Percent) 1 | 2 | 3-4 |
|---|---|---|---|---|---|
| College | Yes | 62 | 2 | 50 | 48 |
| | No or questionable | 63 | 11 | 78 | 11 |
| Non-college | Yes | 41 | 7 | 61 | 32 |
| | No or questionable | 103 | 60 | 35 | 5 |
| Combined | Yes | 103 | 4 | 54 | 42 |
| | No or questionable | 166 | 42 | 51 | 7 |

These figures support the predictions made by the assessment centers. For example, of the 62 college graduates predicted to achieve higher levels of management, 48 percent reached middle management. Of those picked not to achieve middle management, only 11 percent did so. Additional studies have been conducted by

[43] These charts are a combined and more general version of the charts presented by Bray and Grant [1966].

AT&T and others with similar results [Campbell and Bray, 1967, Bray and Campbell, 1968].

## APPENDIX B

### A LIST OF REPRESENTATIVE FIRMS USING MANAGEMENT BY OBJECTIVES (and Source Used)

Bridgeport Brass Company (Mali)

Colt Heating & Ventilation Limited (Humble)

DuPont (Reddin)

General Electric Corporation (Reddin)

General Foods Corporation (Reddin)

General Mills Corporation (Mali)

General Motors Corporation (Reddin)

Grand Union Company (Mali)

Honeywell Corporation (Mali)

John Player & Sons (Humble)

Minneapolis-Moline Company (Mali)

Monsanto Company (Mali)

North Eastern Region of British Railways (Humble)

Otis Elevator Company (Mali)

Pacific Telephone and Telegraph Company

Radio Corporation of America (Reddin)

Royal Navy Supply and Transport Service (Humble)

Shell International (Humble)

Socony Oil Company (Reddin)

St. Regis Paper Company (Mali)

Standard Oil Company (Reddin)

State Farm Insurance Companies (Mali)

3 M Company (Mali)

United Air Lines (Mali)

U. S. Air Force Logistics Command (Reddin)

Urwick Technology Management Limited (Humble)

## APPENDIX C

## MBO MANAGEMENT GUIDE[44]

The Management Guide consists of two separate forms, the first of which identifies the manager, his position, and the overall scope and purpose of his job. The overall scope and purpose of a job is a concise statement which describes the job in general, and how it relates to the organization's overall goals. A communications officer of the Naval Communications Station might have filled in the job analysis form as follows:

NAME: XXXXXXX

POSITION: Communications Officer

DIRECTLY RESPONSIBLE TO:

Commanding Officer

OVERALL SCOPE AND PURPOSE OF JOB:

To effectively organize and control assigned personnel and equipment to provide for receipt, processing and transmission of messages within specific joint and Navy standards.

---

[44]The term and concept of the Management Guide is credited to Humble, Management by Objectives in Action.

The second form of the Management Guide is the key result area form. The results of key results analysis with the superior or MBO advisor are written as a list of key result areas which then form the major parts or responsibilities of the manager's job. This provides the framework for determining key tasks in each of the manager's key result areas to support the overall objectives in steps 1 and 2 of the MBO process discussed in part II. Refer to Figure 5, column (1) for an example of a key result area and listed associated key tasks. The key task forms only the first part of the manager's objectives as a statement of action and requires a measurable performance standard (column 2) to become a reachable objective. The four factors of quality, quantity, cost and time are useful in deciding satisfactory achievement (targets or goals) of the objective. As listed in Figure 5, an additional column is provided to record job improvement items as they might apply to each key task. Suggestions for improvements might be noted on the form between reviews of the manager's job as problems occur or new innovations come to mind during the MBO cycle.

# APPENDIX D

## COMMUNICATIONS DEPARTMENT MANAGEMENT BY OBJECTIVES HANDOUT

### MANAGEMENT BY OBJECTIVES

"A dynamic system which seeks to integrate the organization's need to clarify and achieve its performance and growth goals with the manager's need to contribute and develop himself."

JOHN HUMBLE

The implementation process of Management By Objectives (MBO) within the Communications Department will proceed in basically three phases:

(1) Identification of the Key Result Areas/ Key Tasks of the individual managers;

(2) Identification of possible areas of improvement; and

(3) Progress Reviews.

The three phases will be implemented through the use of three separate forms, which are the (1) Management Guide, (2) Job Improvement Plan, and (3) Performance Appraisal, respectively.

This handout describes the initial preparation of the Management Guide.

* * * * * * * * * * * * * * * *

MANAGEMENT GUIDE

The Management Guide consists of two separate forms, the first of which identifies the manager, his position, and the overall scope and purpose of his job. (These forms are located in the "Forms" section of your notebook.)

The "overall scope and purpose of your job" is a concise statement which describes the job in general, and how it relates to the organization's overall goals.

Example: To organize and control the Operations Department in order to meet the planned operations, service, and contingency requirements of the Fleet.

The second form of the Management Guide is provided to assist you in establishing your Key Result Areas/Key Tasks, and your performance goals.

* * * * * *

Key Result Areas (KRA) - the few important parts of a manager's job which, when performed well, result in the manager performing his whole job effectively.

Expressed in another way, the Key Result Areas are those 20% of the tasks which take up 80% of a manager's time.

Each KRA of your job function should meet the following three tests:

(1) Relevance - it must influence the success or failure of your job;

(2) Independence - it must be reasonably independent to avoid overlapping KRA;

(3) Measurable - it must have established standards of performance in terms of job effectiveness.

In describing your KRA, keep in mind the following:

(1) Use as few words as necessary to describe an area of effectiveness; e.g., "Achievement of Production Goal", "Personnel Training", etc.

(2) Avoid qualitative/quantitative words such as "large", "acceptable", etc.

(3) Avoid the use of dates, timings, etc.

(4) Focus on "Outputs" NOT "Inputs"!! For example, NOT "Maintain Equipment" but "Equipment Availability"; NOT "Train Equipment Operators" but "Operator Effectiveness".

(5) While the number of KRA depend upon each manager, a range of 3 to 7 is normal.

* * * * * *

Key Task - a precise, unambiguous description of a job function which defines an action which leads to a performance standard.

Thus, each KRA will have one or more Key Tasks.

Examples:

| KRA | Key Task |
|---|---|
| Achievement of production goal | Ensure production is maintained at current level. |
| Operations costs | Ensure that costs of department are within budget. |
| Equipment availability | To maintain an effective repair policy. |

* * * * * *

Standards of Performance - a description of the results which will be achieved when each of the Key Tasks is being done well under the present conditions.

Since each KRA must be measurable, standards of performance have to be established in order to measure key task effectiveness.

A performance standard states a result or a condition; e.g., "10,000 units per month", "Growth rate of 10%", etc. Also a standard set should generally not be less than the current level of activity.

To assist in establishing performance goals, one might ask himself: "What level of results will occur if the task is being done well?"

Control Data - the control information by which you yourself can actually monitor the results for which you are responsible.

Specific control data may already be available or you may have to establish new methods of control.

Examples: (1) Monthly operations reports

(2) Budget statistics

(3) Customer complaints

(4) (Work) Tally sheets

* * * * * *

Suggestions for Improving Present Results - are those actions which could be taken to achieve higher performance goals.

All KRA will not necessarily have suggestions for improvement. Although this part of the Management Guide will not specifically be addressed in this first phase, the following examples are listed here to provide a link between the present level of operation and the Job Improvement Plan to come in Phase 2.

Examples: (1) Present level of production is based upon outdated marketing data; suggest a new study be conducted to re-evaluate the level of production.

(2) Monthly operations report is too bulky and time-consuming to prepare. Suggest a more concise report be initiated.

* * * * * *

As you know, these forms are to be completed by you with the assistance of an MBO Advisor, and then approved by your immediate supervisor. Your Management Guide (and later on your Job Improvement Plan) will be the basis of all your future activities.

You are encouraged to think ahead to Phase 2 about possible areas of improvement to be incorporated into your Job Improvement Plan. Keep in mind that although your Management Guide may have been completed and approved, the flexibility of MBO provides for greater effectiveness only when new "thoughts" are added to the "old"!

GOOD LUCK

MANAGEMENT GUIDE

NAME:

POSITION:

DIRECTLY RESPONSIBLE TO:

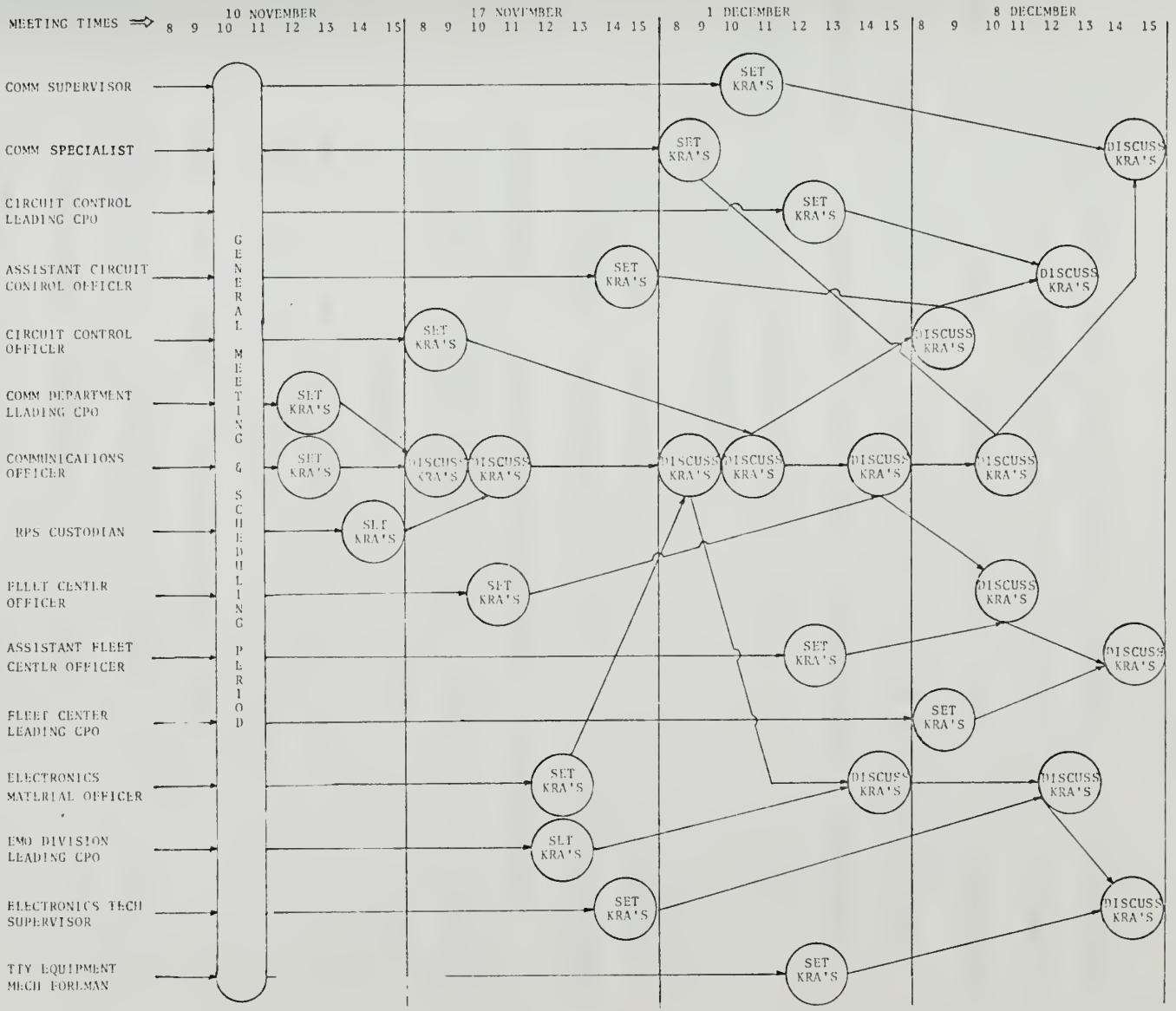
---

OVERALL SCOPE AND PURPOSE OF JOB:

| KEY RESULT AREAS/ KEY TASKS | PERFORMANCE STANDARDS | CONTROL DATA | SUGGESTIONS FOR IMPROVING RESULTS | REMARKS |
|---|---|---|---|---|
| | | | | |

## PROPOSED SCHEDULE OF EVENTS

| DATE | EVENT |
|---|---|
| 3 Nov | General meeting with MBO films and question-answer period. Discuss Comm Dept's Key Results Areas with Comm Officer. Schedule general meeting for 10 Nov. |
| 10 Nov | Discuss Key Results Areas with CO. Conduct general meeting to distribute MBO notebooks and discuss procedural handouts. Managers commence defining their own Key Results Areas. Schedule individual meetings for 17 Nov. |
| 17 Nov & 1 Dec | MBO Advisors conduct individual meetings with Managers to formulate Key Results Areas (KRA) and discuss KRA with immediate supervisor. |
| 24 Nov | HOLIDAY |
| 8 Dec | Carry-over from 1 Dec meetings. Schedule Management Guide/Job Improvement Plan meetings for period 13-15 Dec. |
| 13 Dec thru 15 Dec | Management Guide/Job Improvement Plan meetings as scheduled. |
| 22 Dec & 29 Dec | HOLIDAY - MERRY CHRISTMAS & HAPPY NEW YEAR |
| 5 Jan & 12 Jan | (OPEN) |
| 19 Jan thru 23 Feb | Progress/Performance Reviews |
| 2 Mar | Program Assessment |


MEETING TIMES ⇒
10 NOVEMBER
17 NOVEMBER
1 DECEMBER
8 DECEMBER
8 9 10 11 12 13 14 15
COMM SUPERVISOR
COMM SPECIALIST
CIRCUIT CONTROL LEADING CPO
ASSISTANT CIRCUIT CONTROL OFFICLR
CIRCUIT CONTROL OFFICLR
COMM DEPARTMENT LLADING CPO
COMMUNICATIONS OFFICER
RPS CUSTODIAN
FLLET CENTLR OFFICER
ASSISTANT FLEET CENTLR OFFICER
FLEET CENTER LEADING CPO
ELECTRONICS MATLRIAL OFFICER
EMO DIVISION LEADING CPO
ELECTRONICS TECH SUPERVISOR
TIY EQUIPMENT MECH FORLMAN
GENERAL MEETING & SCHEDULING PERIOD
SET KRA'S
DISCUSS KRA'S
SLF KRA'S

## APPENDIX E

### Computer Simulation Model Assumptions

The assumptions made regarding this simulation are based upon our knowledge of the MBO process correlated to a naval communications station environment. Although MBO has never been implemented in a military organization, the input distributions assumed for this simulation are based upon our military experience and limited data derived from MBO literature [Humble, 1970].

I. Input Approximation Definitions

A. Normal - the scheduling and conducting of MBO meetings were based on the Standard Normal (0, 1), and were modified accordingly to represent expected means and standard deviations. For the purpose of this simulation, one standard deviation was assumed to be one-sixth the mean of the normal, such that six standard deviations would effectively cover the entire range from zero time to the mean, and from the mean to the maximum time (See Figure 3).

B. Exponential - the introduction of higher-priority situations to interrupt the MBO process was based upon the standard exponential distribution (0-1), and modified accordingly to represent logical inter-arrival times.

C. Uniform - used sparingly throughout the simulation to advance the clock to represent a minor time evolution.

II. Input Distributions

A. Individual Approach

1. Normal Distributions

| Function | Mean | Standard Deviation |
|---|---|---|
| SKEDG | 24 Hrs. | 4 Hrs. |
| SKEDI | 8 Hrs. | 1.3 Hrs. |
| GMEET | 2 Hrs. | .3 Hrs. |
| IMEET | 2 Hrs. | .3 Hrs. |
| RMEET | 1.5 Hrs. | .25 Hrs. |
| MGTGD | 40 Hrs. | 6.6 Hrs. |

2. Exponential Distributions

Average inter-arrival time: 2 interruptions per 8-hour workday.

Average length of interruption: 30 minutes

3. Uniform Distributions:

Minor time evolutions which advance the clock a given length of time.

B. Group Approach

1. Normal Distributions

| Function | Mean | Standard Deviation |
|---|---|---|
| SKEDG | 24.0 Hrs | 4.0 Hrs |
| GMEET | 3.0 | .5 |
| MEET1 | 1.5 | .25 |
| MEET2 | .5 | .1 |
| SKEDR | 8.0 | 1.3 |
| RMEET | 1.5 | .25 |

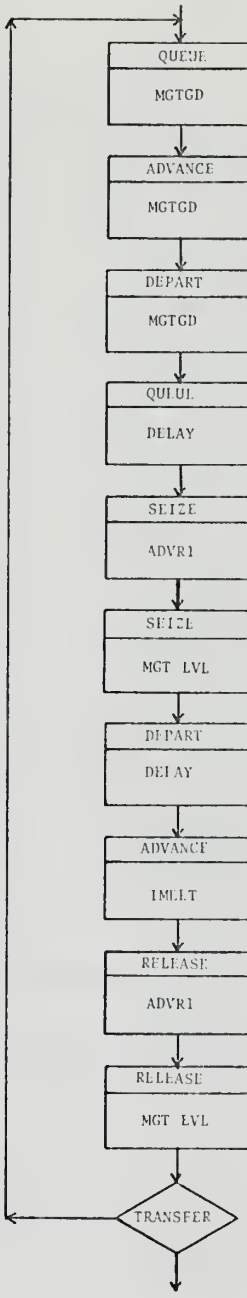
2. Exponential Distributions

a. Average inter-arrival time: 2 interruptions per 8-hour workday

b. Average length of interruption: 30 minutes.

INDIVIDUAL APPROACH

SUBROUTINES A AND E (DETAILED)




STATISTICS GATHERING PROCESS

TIME ADVANCE TO SIMULATE PREPARATION OF MANAGEMENT GUIDE

STATISTICS GATHERING PROCESS

SEIZE ADVISOR FOR MEETING

SEIZE APPROPRIATE MANAGEMENT LEVEL FOR MEETING

CONDUCT INDIVIDUAL KRA MEETING

RELEASE ADVISOR

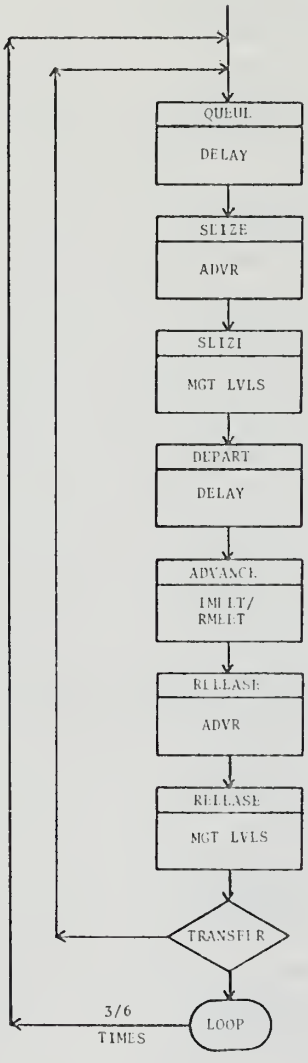
RELEASE MANAGEMENT LEVEL

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS OF KRA MEETING

FIGURE 7

INDIVIDUAL APPROACH

SUBROUTINES B, C, D, F, G, AND H (DETAILED)




STATISTICS GATHERING PROCESS

SEIZE ADVISOR FOR MEETING

SEIZE APPROPRIATE MANAGEMENT LEVELS FOR MEETING

STATISTICS GATHERING PROCESS

CONDUCT INDIVIDUAL KRA MEETING OR REVIEW MEETING AS APPROPRIATE

RELEASE ADVISOR

RELEASE MANAGEMENT LEVELS

TRANSFER BLOCK TO SIMULATE VARYING PROBABILITIES OF SUCCESS OF KRA MEETINGS (OMITTED IN S/R C, D, G, AND H)

LOOP 3 TIMES (S/R B, C, AND D) OR 6 TIMES (S/R F, G, AND H) TO SIMULATE SEPARATE INDIVIDUAL MEETINGS OR REVIEW MEETINGS

FIGURE 8

TEAM APPROACH

SUBROUTINES AGINA, AGINC, AND AGINF
(DETAILED)

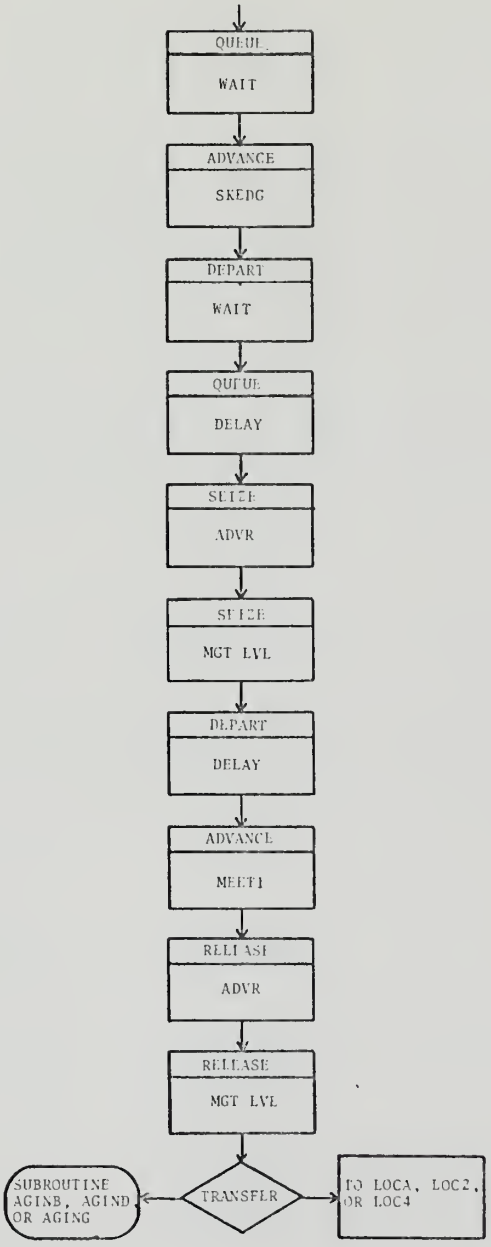



FIGURE 9

TEAM APPROACH

SUBROUTINES AGINB, AGIND, AGINE, AGING, AND AGINH (DETAILED)

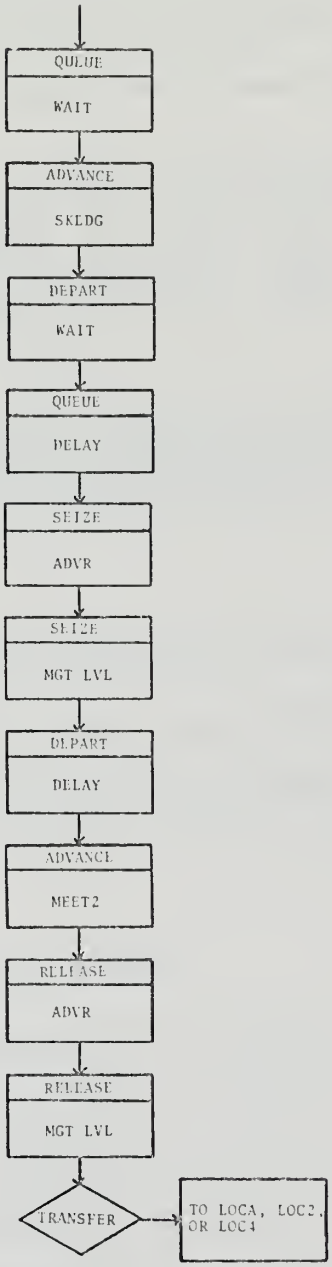



FIGURE 10

# COMPUTER PRINTED INPUT LISTINGS

THE FOLLOWING COMPUTER INPUTS ARE THE COMPLETE LISTINGS REQUIRED TO SIMULATE THE TWO IMPLEMENTATION APPROACHES DESCRIBED IN CHAPTER III, PART E. THE SIMULATION WAS RUN ON AN IBM SYSTEM 360/67. FOR FURTHER INFORMATION, REFER TO THOMAS J. SCHRIBER'S TEXT 'GENERAL PURPOSE SIMULATION SYSTEM/360'.

THE CONTROL CARDS INSERTED AT THE END OF THE RESPECTIVE PROGRAMS AUTOMATICALLY VARY THE 'PROBABILITY OF SUCCESS' FACTORS DURING EACH SUCCESSIVE RUN. (SEE THE DETAILED SUBROUTINES OF THE SYSTEM FLOWCHARTS LOCATED IN APPENDIX E FOR FURTHER CLARIFICATION.)

## INDIVIDUAL APPROACH

SIMULATE

SYMBOLIC DEFINITIONS

| | |
|---|---|
| SKEDG | TIME REQUIRED TO SCHEDULE A GENERAL MEETING |
| SKEDI | TIME REQUIRED TO SCHEDULE AN INDIVIDUAL MEETING |
| GMEET | TIME REQUIRED TO CONDUCT A GENERAL MEETING |
| IMEET | TIME REQUIRED TO CONDUCT AN INDIVIDUAL MEETING |
| RMEET | TIME REQUIRED TO CONDUCT A REVIEW MEETING |
| MGTGD | TIME REQUIRED TO PREPARE MANAGEMENT GUIDE |
| RTIME | RESIDENCE TIME OF MBO TRANSACTION IN SYSTEM |
| INTRP | MBO CONFERENCES IN SESSION WHICH ARE INTERRUPTED BY HIGHER PRIORITY SITUATIONS |
| DELAY | SCHEDULED MBO MEETINGS WHICH ARE DELAYED IN STARTING DUE TO HIGHER PRICRITY SITUATIONS |

```
*       THE FOLLOWING VARIABLE FUNCTIONS ARE USED TO
*       APPROXIMATE TIME ADVANCES BASED UPON THE  CONTINUOUS
*       FUNCTION NORMAL (0,1).
*
SKEDG   FVARIABLE   240*FN$SNORM+1440     M=24 HRS/SD=4 HRS
*
SKEDI   FVARIABLE   80*FN$SNORM+480       M=8 HRS/SD=1.3 HRS
*
GMEET   FVARIABLE   20*FN$SNORM+120       M=2 HRS/SD=.3 HRS
*
IMEET   FVARIABLE   20*FN$SNORM+120       M=2 HRS/SD=.3 HRS
*
RMEET   FVARIABLE   15*FN$SNORM+90        M=1.5 HRS/SD=.25 HRS
*
MGTGD   FVARIABLE   400*FN$SNORM+2400     M=40 HRS/SD= 6.6 HRS
*
*
*       DEFINITION OF CONTINUOUS FUNCTION, NORMAL (0,1), USED
*       TO APPROXIMATE TIME ADVANCES IN MODEL SEGMENT I.
*
SNORM   FUNCTION    RN1,C25
*
0,-5/.00003,-4/.00135,-3/.00621,-2.5/.02275,-2
.06681,-1.5/.11507,-1.2/.15866,-1/.21186,-.8/.27425,-.6
.34458,-.4/.42074,-.2/.5,0/.57926,.2/.65542,.4
.72575,.6/.78814,.8/.84134,1/.88493,1.2/.93319,1.5
.97725,2/.99379,2.5/.99865,3/.99997,4/1,5
*
*
*       DEFINITION OF CONTINUOUS FUNCTION, EXPONENTIAL DISTPI
*       BUTION (0 TO 1), USED TO GENERATE TRANSACTIONS IN
*       MODEL SEGMENT II.
*
XPDIS   FUNCTION    RN2,C24
*
0,0/.1,.104/.2,.222/.3,.355/.4,.509/.5,.69/.6,.915/.7,1.2
.75,1.38/.8,1.6/.84,1.83/.88,2.12/.9,2.3/.92,2.52/.94,2.81
.95,2.99/.96,3.2/.97,3.5/.98,3.9/.99,4.6/.995,5.3/.998,6.2
.999,7/.9998,8
*
*
*       DEFINITION OF TABLES
*
RTIME   TABLE       M1,14400,2400,11
*
INTRP   QTABLE      INTRP,10,10,11
*
DELAY   QTABLE      DELAY,10,10,7
*
MGTGD   QTABLE      MGTGD,1440,240,10
*
*
*       RANDOM NUMBER GENERATOR CONTROL CARD
*
RNG     RMULT       17,481
*
*
*       MODEL SEGMENT I
*
*       EACH TRANSACTION REPRESENTS ONE IMPLEMENTATION OF MBO
```

```
*       IN A NAVCOMMSTA USING TWO ADVISORS AND THE
*       INDIVIDUAL APPROACH
*
*
        GENERATE    20000,,,10
        QUEUE       WAIT
        ADVANCE     V$SKEDG          SCHEDULE FIRST TWO INTRO-
        DEPART      WAIT             DUCTORY MEETINGS FOR ALL
        QUEUE       DELAY            LEVELS OF MANAGEMENT
        SEIZE       ADVR
        SEIZE       LVL1
        SEIZE       LVL2
        SEIZE       LVL3
        DEPART      DELAY
        ADVANCE     V$GMEET          FIRST INTRODUCTORY MEETING
        RELEASE     ADVR
        RELEASE     LVL1
        RELEASE     LVL2
        RELEASE     LVL3
        QUEUE       WAIT
        ADVANCE     960              TWO DAYS BETWEEN MEETINGS
        DEPART      WAIT
        QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL1
        SEIZE       LVL2
        SEIZE       LVL3
        DEPART      DELAY
        ADVANCE     V$GMEET          SECOND INTRODUCTORY MEETING
        RELEASE     ADVR
        RELEASE     LVL1
        RELEASE     LVL2
        RELEASE     LVL3
AGINA   QUEUE       WAIT
        ADVANCE     V$SKEDG          SCHEDULE LVL1 KRA MEETING
        DEPART      WAIT
        QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL1
        DEPART      DELAY
        ADVANCE     V$GMEET          LVL1 KRA MEETING
        RELEASE     ADVR
        RELEASE     LVL1
        QUEUE       WAIT
        ADVANCE     V$SKEDI          SCHEDULE INDIVIDUAL MEETING
        DEPART      WAIT             TO VERIFY MANAGEMENT GUIDE
CHG1    TRANSFER    .3,,AGINA
LOC1    SPLIT       1,LOC1A
        ASSIGN      1,K3
LOP1    QUEUE       MGTGD
        ADVANCE     V$MGTGD          LVL21 MANAGERS PREPARE
        DEPART      MGTGD            MANAGEMENT GUIDE
        QUEUE       DELAY
        SEIZE       ADVR1
        SEIZE       LVL21
        DEPART      DELAY
        ADVANCE     V$IMEET          LVL21 MANAGERS REVIEW MAN-
        RELEASE     ADVR1            AGEMENT GUIDE WITH ADVISOR
        RELEASE     LVL21
CHG2    TRANSFER    .1,,LOP1
CHG2A   LOOP        1,LOP1
        TRANSFER    ,SKIP1
LOC1A   ASSIGN      1,K3
LOP1A   QUEUE       DELAY
        SEIZE       ADVR2
        SEIZE       LVL22
        DEPART      DELAY
        ADVANCE     V$IMEET          LVL22 MANAGERS REVIEW MAN-
        RELEASE     ADVR2            AGEMENT GUIDE WITH ADVISOR
        RELEASE     LVL22
CHG3    TRANSFER    .1,,LOP1A
CHG3A   LOOP        1,LOP1A
```

```
SKIP1   ASSEMBLE    2
        QUEUE       WAIT
        ADVANCE     V$SKEDI
        DEPART      WAIT
        SPLIT       1,LOC2
LOP2    ASSIGN      1,K3
LOP2A   QUEUE       DELAY
        SEIZE       ADVR1
        SEIZE       LVL11
        SEIZE       LVL21
        DEPART      DELAY
        ADVANCE     V$RMEET         LVL21 MANAGEMENT GUIDE
        RELEASE     ADVR1           REVIEW MEETING WITH
        RELEASE     LVL11           SUPERVISOR
        RELEASE     LVL21
        LOOP        1,LOP2A
        TRANSFER    ,SKIP2
LOC2    ASSIGN      1,K3
LOP3    QUEUE       DELAY
        SEIZE       ADVR2
        SEIZE       LVL12
        SEIZE       LVL22
        DEPART      DELAY
        ADVANCE     V$RMEET         LVL22 MANAGEMENT GUIDE
        RELEASE     ADVR2           REVIEW MEETING WITH
        RELEASE     LVL12           SUPERVISOR
        RELEASE     LVL22
        LOOP        1,LOP3
SKIP2   ASSEMBLE    2
        QUEUE       WAIT
        ADVANCE     V$SKEDI
        DEPART      WAIT
        SPLIT       1,LOC3
        ASSIGN      1,K6
LOP3A   QUEUE       MGTGD
        ADVANCE     V$MGTGD         LVL31 MANAGERS PREPARE
        DEPART      MGTGD           MANAGEMENT GUIDE
        QUEUE       DELAY
        SEIZE       ADVR1
        SEIZE       LVL31
        DEPART      DELAY
        ADVANCE     V$IMEET         LVL31 MANAGERS REVIEW MAN-
        RELEASE     ADVR1           AGEMENT GUIDE WITH ADVISOR
        RELEASE     LVL31
CHG4    TRANSFER    .1,,LOP3A
CHG4A   LOOP        1,LOP3A
        TRANSFER    ,SKIP3
LOC3    ASSIGN      1,K6
LOP3B   QUEUE       DELAY
        SEIZE       ADVR2
        SEIZE       LVL32
        DEPART      DELAY
        ADVANCE     V$IMEET         LVL32 MANAGERS REVIEW MAN-
        RELEASE     ADVR2           AGEMENT GUIDE WITH ADVISOR
        RELEASE     LVL32
CHG5    TRANSFER    .1,,LOP3B
CHG5A   LOOP        1,LOP3B
SKIP3   ASSEMBLE    2
        QUEUE       WAIT
        ADVANCE     V$SKEDI
        DEPART      WAIT
        SPLIT       1,LOC4
        ASSIGN      1,K6
LOP4A   QUEUE       DELAY
        SEIZE       ADVR1
        SEIZE       LVL21
        SEIZE       LVL31
        DEPART      DELAY
        ADVANCE     V$RMEET         LVL31 MANAGEMENT GUIDE
        RELEASE     ADVR1           REVIEW MEETING WITH
        RELEASE     LVL21           SUPERVISOR
        RELEASE     LVL31
```

```
         LOOP        1,LOP4A
         TRANSFER    ,SKIP4
LOC4     ASSIGN      1,K6
LOP4B    QUEUE       DELAY
         SEIZE       ADVR2
         SEIZE       LVL22
         SEIZE       LVL32
         DEPART      DELAY
         ADVANCE     V$PMEET          LVL32 MANAGEMENT GUIDE
         RELEASE     ADVR2            REVIEW MEETING WITH
         RELEASE     LVL22            SUPERVISOR
         RELEASE     LVL32
         LOOP        1,LOP4B
SKIP4    ASSEMBLE    2
         TABULATE    RTIME
         TERMINATE                    MBO IMPLEMENTATION COMPLETE
*
*
*********
*        MODEL SEGMENTS II, III, AND IV
*
*        EACH TRANSACTION REPRESENTS HIGHER-PRIORITY
*        SITUATIONS WHICH INTERRUPT THE MBO PROCESS AT ALL
*        MANAGEMENT LEVELS
*
CHG      GENERATE    240,FN$XPDIS,,,1
         PREEMPT     ADVR             INTERRUPTS LVL1 MEETINGS
         QUEUE       INTRP
         ADVANCE     30,FN$XPDIS
         DEPART      INTRP
         RETURN      ADVR
         TERMINATE
*
CHG      GENERATE    240,FN$XPDIS,,,1
         PREEMPT     ADVR1            INTERRUPTS LVL2 MEETINGS
         QUEUE       INTRP
         ADVANCE     30,FN$XPDIS
         DEPART      INTRP
         RETURN      ADVR1
         TERMINATE
*
CHG      GENERATE    240,FN$XPDIS,,,1
         PREEMPT     ADVR2            INTERRUPTS LVL3 MEETINGS
         QUEUE       INTRP
         ADVANCE     30,FN$XPDIS
         DEPART      INTRP
         RETURN      ADVR2
         TERMINATE
*
*********
*        MODEL SEGMENT V              TIMER SEGMENT
*
         GENERATE    900000           COMMENCE IMPLEMENTATION
         TERMINATE   1                CLOCK
*
*********
*        CONTROL CARDS
*
         START       1                START FIRST RUN
*
CHG1     TRANSFER    .4,LOC1,AGINA
CHG2     TRANSFER    .2,CHG2A,LOP1
CHG3     TRANSFER    .2,CHG3A,LOP1A
```

```
CHG4    TRANSFER    .2,CHG4A,LOP3A
CHG5    TRANSFER    .2,CHG5A,LOP3B
RNG     RMULT       89,87
        CLEAR
*
        START       1                   START SECOND RUN
*
*
CHG1    TRANSFER    .5,LOC1,AGINA
CHG2    TRANSFER    .3,CHG2A,LOP1
CHG3    TRANSFER    .3,CHG3A,LOP1A
CHG4    TRANSFER    .3,CHG4A,LOP3A
CHG5    TRANSFER    .3,CHG5A,LOP3B
RNG     RMULT       53,47
        CLEAR
*
        START       1                   START THIRD RUN
*
*
CHG1    TRANSFER    .6,LOC1,AGINA
CHG2    TRANSFER    .4,CHG2A,LOP1
CHG3    TRANSFER    .4,CHG3A,LOP1A
CHG4    TRANSFER    .4,CHG4A,LOP3A
CHG5    TRANSFER    .4,CHG5A,LOP3B
RNG     RMULT       3,27
        CLEAR
*
        START       1                   START FOURTH RUN
*
*
CHG1    TRANSFER    .7,LOC1,AGINA
CHG2    TRANSFER    .5,CHG2A,LOP1
CHG3    TRANSFER    .5,CHG3A,LOP1A
CHG4    TRANSFER    .5,CHG4A,LOP3A
CHG5    TRANSFER    .5,CHG5A,LOP3B
RNG     RMULT       93,89
        CLEAR
*
        START       1                   START FIFTH RUN
*
        END
*
*
*
```

```
*   MEET2   TIME REQUIRED TO CONDUCT A THIRD GENERAL MEETING
*
*   RMEET   TIME REQUIRED TO CONDUCT A REVIEW MEETING
*
*   RTIME   RESIDENCE TIME OF MBO TRANSACTION IN SYSTEM
*
*   INTRP   MBO CONFERENCES IN SESSION WHICH ARE INTERRUPTED
*           BY HIGHER PRIORITY SITUATIONS
*
*   DELAY   SCHEDULED MBO MEETINGS WHICH ARE DELAYED IN
*           STARTING DUE TO HIGHER PRIORITY SITUATIONS
*
*
*       THE FOLLOWING VARIABLE FUNCTIONS ARE USED TO
*       APPROXIMATE TIME ADVANCES BASED UPON THE  CONTINUOUS
*       FUNCTION NORMAL (0,1).
*
 SKEDG FVARIABLE  240*FN$SNORM+1440     M=24 HRS/SD=4 HRS
*
 SKEDR FVARIABLE  80*FN$SNORM+480       M=8 HRS/SD=1.3 HRS
*
 GMEET FVARIABLE  30*FN$SNORM+180       M=3 HRS/SD=.5 HRS
*
 MEET1 FVARIABLE  15*FN$SNORM+90        M=1.5 HRS/SD=.25 HRS
*
 MEET2 FVARIABLE  5*FN$SNORM+30         M=.5 HRS/SD=.1 HRS
*
 RMEET FVARIABLE  15*FN$SNORM+90        M=1.5 HRS/SD=.25 HRS
*
*
*       DEFINITION OF CONTINUOUS FUNCTION, NORMAL (0,1), USED
*       TO APPROXIMATE TIME ADVANCES IN MODEL SEGMENT I.
*
 SNORM FUNCTION   RN1,C25
*
0,-5/.00003,-4/.00135,-3/.00621,-2.5/.02275,-2
.06681,-1.5/.11507,-1.2/.15866,-1/.21186,-.8/.27425,-.6
.34458,-.4/.42074,-.2/.5,0/.57926,.2/.65542,.4
.72575,.6/.78814,.8/.84134,1/.88493,1.2/.93319,1.5
.97725,2/.99379,2.5/.99865,3/.99997,4/1,5
*
*
*       DEFINITION OF CONTINUOUS FUNCTION, EXPONENTIAL DISTRI
*       BUTION (0 TO 1), USED TO GENERATE TRANSACTIONS IN
*       MODEL SEGMENT II.
*
 XPDIS FUNCTION   RN2,C24
*
0,0/.1,.104/.2,.222/.3,.355/.4,.509/.5,.69/.6,.915/.7,1.2
.75,1.38/.8,1.6/.84,1.83/.88,2.12/.9,2.3/.92,2.52/.94,2.81
.95,2.99/.96,3.2/.97,3.5/.98,3.9/.99,4.6/.995,5.3/.998,6.2
.999,7/.9998,8
*
*
*       DEFINITION OF TABLES
*
 RTIME TABLE      M1,4800,2400,6
*
 INTRP QTABLE     INTRP,10,10,11
*
 DELAY QTABLE     DELAY,10,10,7
*
*
```

```
*       RANDOM NUMBER GENERATOR CONTROL CARD
*
RNG     RMULT       17,481
*
*
*
*       MODEL SEGMENT I
*
*       EACH TRANSACTION REPRESENTS ONE IMPLEMENTATION OF MBO
*       IN A NAVCOMMSTA USING ONE ADVISOR AND THE TEAM
*       APPROACH
*
        GENERATE    20000,,,10
        QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE INTRODUCTORY MEET-
        DEPART      WAIT            ING FOR LVL1
        QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL1
        DEPART      DELAY
        ADVANCE     V$GMEET         INTRODUCTORY MEETING
        RELEASE     ADVR
        RELEASE     LVL1
        QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE LVL1 KRA MEETING
        DEPART      WAIT
        QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL1
        DEPART      DELAY
        ADVANCE     V$GMEET         LVL1 KRA MEETING
        RELEASE     ADVR
        RELEASE     LVL1
CHG1    TRANSFER    .3,LOCA,AGINA
LOCA    QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE INTRODUCTORY MEET-
        DEPART      WAIT            ING FOR LVL2 AND LVL3
        QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL2
        SEIZE       LVL3
        DEPART      DELAY
        ADVANCE     V$GMEET         LVL2 AND LVL3 INTRODUCTOR
        RELEASE     ADVR            MEETING
        RELEASE     LVL3
        RELEASE     LVL2
LOC1    QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE LVL2 KRA MEETING
        DEPART      WAIT
        ASSIGN      1,K3
LOC1A   QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL2
        DEPART      DELAY
        ADVANCE     V$GMEET         LVL2 KRA MEETING
        RELEASE     ADVR
        RELEASE     LVL2
        LOOP        1,LOC1A
CHG2    TRANSFER    .3,LOC2,AGINC
LOC2    QUEUE       WAIT
        ADVANCE     V$SKEDR         SCHEDULE LVL2 KRA REVIEW
        DEPART      WAIT            MEETING WITH LVL1
        ASSIGN      1,K3
LOC2A   QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL1
        SEIZE       LVL2
        DEPART      DELAY
```

```
        ADVANCE     V$RMEET         LVL2 KRA REVIEW MEETING
        RELEASE     ADVR
        RELEASE     LVL1
        RELEASE     LVL2
        LOOP        1,LOC2A
        TRANSFER    .1,LOC3,AGINE
LOC3    QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE LVL3 KRA MEETING
        DEPART      WAIT
        ASSIGN      1,K5
LOC3A   QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL3
        DEPART      DELAY
        ADVANCE     V$GMEET         LVL3 KRA MEETING
        RELEASE     ADVR
        RELEASE     LVL3
        LOOP        1,LOC3A
CHG3    TRANSFER    .3,LOC4,AGINF
LOC4    QUEUE       WAIT
        ADVANCE     V$SKEDR         SCHEDULE LVL3 KRA REVIEW
        DEPART      WAIT            MEETING WITH LVL2
        ASSIGN      1,K5
LOC4A   QUEUE       DELAY
        SEIZE       ADVR
        SEIZE       LVL2
        SEIZE       LVL3
        DEPART      DELAY
        ADVANCE     V$RMEET         LVL3 KRA REVIEW MEETING
        RELEASE     ADVR
        RELEASE     LVL2
        RELEASE     LVL3
        LOOP        1,LOC4A
        TRANSFER    .1,LOC5,AGINH
LOC5    TABULATE    RTIME
        TERMINATE
AGINA   QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE SECOND LVL1 KRA
        DEPART      WAIT            MEETING AFTER FIRST KRA
        QUEUE       DELAY           INVALID
        SEIZE       ADVR
        SEIZE       LVL1
        DEPART      DELAY
        ADVANCE     V$MEET1         SECOND LVL1 KRA MEETING
        RELEASE     ADVR            WITH LEARNING-CURVE EFFECT
        RELEASE     LVL1
        TRANSFER    .1,LOCA,AGINB
AGINB   QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE THIRD LVL1 KRA
        DEPART      WAIT            MEETING AFTER SECOND KRA
        QUEUE       DELAY           INVALID
        SEIZE       ADVR
        SEIZE       LVL1
        DEPART      DELAY
        ADVANCE     V$MEET2         THIRD LVL1 KRA MEETING
        RELEASE     ADVR            WITH ADDITIONAL LEARNING-
        RELEASE     LVL1            CURVE EFFECT
        TRANSFER    ,LOCA
AGINC   QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE SECOND LVL2 KRA
        DEPART      WAIT            MEETING AFTER FIRST KRA
        QUEUE       DELAY           INVALID
        SEIZE       ADVR
        SEIZE       LVL2
        DEPART      DELAY
        ADVANCE     V$MEET1         SECOND LVL2 KRA MEETING
        RELEASE     ADVR            WITH LEARNING-CURVE EFFECT
        RELEASE     LVL2
        TRANSFER    .1,LOC2,AGIND
AGIND   QUEUE       WAIT
        ADVANCE     V$SKEDG         SCHEDULE THIRD LVL2 KRA
        DEPART      WAIT            MEETING AFTER SECOND KRA
```

```
         QUEUE       DELAY              INVALID
         SEIZE       ADVR
         SEIZE       LVL2
         DEPART      DELAY
         ADVANCE     V$MEET2            THIRD LVL2 KRA MEETING
         RELEASE     ADVR               WITH ADDITIONAL LEARNING-
         RELEASE     LVL2               CURVE EFFECT
         TRANSFER    ,LOC2
AGINE    QUEUE       WAIT
         ADVANCE     V$SKEDG            SCHEDULE LVL2 KRA MEETING
         DEPART      WAIT               AFTER LVL2 KRA REVIEW
         QUEUE       DELAY
         SEIZE       ADVR
         SEIZE       LVL2
         DEPART      DELAY
         ADVANCE     V$MEET2            SECOND LVL2 KRA REVIEW
         RELEASE     ADVR               MEETING
         RELEASE     LVL2
         TRANSFER    ,LOC2
AGINF    QUEUE       WAIT
         ADVANCE     V$SKEDG            SCHEDULE SECOND LVL3 KRA
         DEPART      WAIT               MEETING AFTER FIRST KRA
         QUEUE       DELAY              INVALID
         SEIZE       ADVR
         SEIZE       LVL3
         DEPART      DELAY
         ADVANCE     V$MEET1            SECOND LVL3 KRA MEETING
         RELEASE     ADVR               WITH LEARNING-CURVE EFFECT
         RELEASE     LVL3
         TRANSFER    .1,LOC4,AGING
AGING    QUEUE       WAIT
         ADVANCE     V$SKEDG            SCHEDULE THIRD LVL3 KRA
         DEPART      WAIT               MEETING AFTER SECOND KRA
         QUEUE       DELAY              INVALID
         SEIZE       ADVR
         SEIZE       LVL3
         DEPART      DELAY
         ADVANCE     V$MEET2            THIRD LVL3 KRA MEETING
         RELEASE     ADVR               WITH ADDITIONAL LEARNING-
         RELEASE     LVL3               CURVE EFFECT
         TRANSFER    ,LOC4
AGINH    QUEUE       WAIT
         ADVANCE     V$SKEDG            SCHEDULE LVL3 KRA MEETING
         DEPART      WAIT               AFTER LVL3 KRA REVIEW
         QUEUE       DELAY
         SEIZE       ADVR
         SEIZE       LVL3
         DEPART      DELAY
         ADVANCE     V$MEET2            SECOND LVL3 KRA REVIEW
         RELEASE     ADVR               MEETING
         RELEASE     LVL3
         TRANSFER    ,LOC4
*
*
*
*        MODEL SEGMENT II
*
*
*        EACH TRANSACTION REPRESENTS HIGHER-PRIORITY
*        SITUATIONS WHICH INTERRUPT THE MBO PROCESS AT ALL
*        MANAGEMENT LEVELS
*
*
 CHG     GENERATE    240,FN$XPDIS,,,1
         PREEMPT     ADVR               INTERRUPTS MBO MEETINGS
         QUEUE       INTRP
         ADVANCE     30,FN$XPDIS
         DEPART      INTRP
         RETURN      ADVR
         TERMINATE
*
*
```

```
*
*       MODEL SEGMENT III               TIMER SEGMENT
*
*
        GENERATE    900000              COMMENCE IMPLEMENTATION
        TERMINATE   1                   CLOCK
*
*
*
*       CONTROL CARDS
*
*
        START       1                   START FIRST RUN
*
*
CHG1    TRANSFER    .4,LOCA,AGINA
CHG2    TRANSFER    .4,LOC2,AGINC
CHG3    TRANSFER    .4,LOC4,AGINF
RNG     RMULT       39,93
        CLEAR
*
        START       1                   START SECOND RUN
*
*
CHG1    TRANSFER    .5,LOCA,AGINA
CHG2    TRANSFER    .5,LOC2,AGINC
CHG3    TRANSFER    .5,LOC4,AGINF
RNG     RMULT       473,347
        CLEAR
*
        START       1                   START THIRD RUN
*
*
CHG1    TRANSFER    .6,LOCA,AGINA
CHG2    TRANSFER    .6,LOC2,AGINC
CHG3    TRANSFER    .6,LOC4,AGINF
RNG     RMULT       1,1
        CLEAR
*
        START       1                   START FOURTH RUN
*
*
CHG1    TRANSFER    .7,LOCA,AGINA
CHG2    TRANSFER    .7,LOC2,AGINC
CHG3    TRANSFER    .7,LOC4,AGINF
RNG     RMULT       7,21
        CLEAR
*
        START       1                   START FIFTH RUN
*
        END
*
*
```

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13. ABSTRACT

This thesis is a study of the integrative management technique of Management by Objectives and its application to problems of naval communications management, career development and training that are of concern to the headquarters level of naval communications. As part of this study, a pilot Management by Objectives implementation project was conducted at the U. S. Naval Communications Station San Francisco, based in part on a computer simulation model developed for the naval communications environment. The project was designed to examine implementation problems unique to the communications environment, and to assist in developing key objectives for operational and personnel management of the Communications Department. Problems of the implementation and results obtained are discussed, including recommendations for further study to fully assess the contributions Management by Objectives can make to naval communications.

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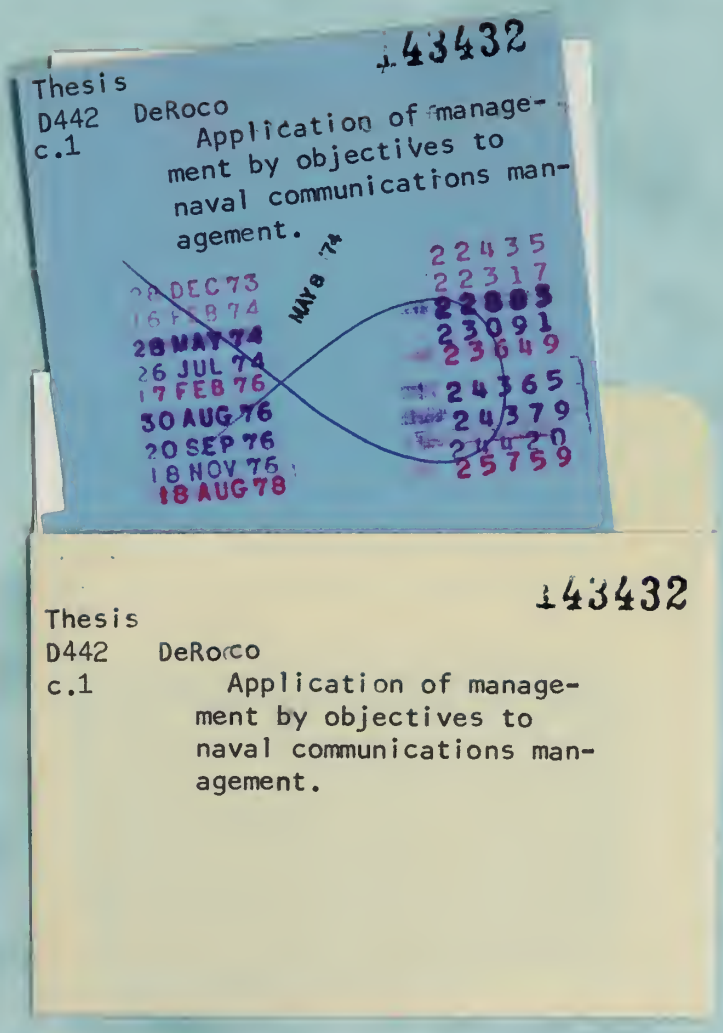


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